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PART I.

Original Contributions.

ON NEEDLE OPERATIONS IN CASES OF DETACHED RETINA.

By WM. BOWMAN, F.R.S.

A PERUSAL of the very interesting paper of von Graefe, translated by Mr. Rogers in the present part of our "Reports," induces me to record the results of my own operations in cases of detached retina, though my conclusions on the subject are as yet extremely incomplete.

I have only operated at all in such cases since 1862, and my object has never been to give external vent to fluid, though this has almost always been one immediate effect of my punctures, but rather to open a permanent communication inwards from the subretinal space, under the idea of allowing the effused fluid to escape into the vitreous chamber, rather than to spread further between the retina and choroid, thereby further severing their organic connection. So slight is this connection, that fluid effused at one part easily gravitates to another more dependent part.

We are at present very ignorant as to the precise pathogenesis of these effusions. I have seen several examples of them as a direct consequence of external injury to healthy organs. They are very prone, however, to occur in myopic eyes, where we can understand that the general extension of all the coats in the elongation of the globe would facilitate such a sort of sliding of the retina on the choroid, as might favour a severance of their slight union; or that state of the coats, whatever it may be called, which attends the elongation of the globe, may itself dispose to subretinal dropsy. Hypothetically, we may imagine the effusion to occur from inflammatory causes, the fluid being in that case a product thrown between the membranes, and forcibly tearing them asunder. It might be secreted over a larger or smaller area, and spread more or less widely from its source, so as to do secondary damage according to its amount or the rapidity of its formation. On the other hand, any atrophy or diminution of the bulk of the vitreous may be conceived to produce the same effect by lessening support on the vitreous surface of the retina. Perhaps difference in the degree of intervention of such causes as these may explain the important differences we witness in the course of the phenomena in question. I have no doubt whatever that effusions of blood into the choroido-retinal space, and thence into the vitreous, sometimes occur in consequence of a previous diminution of the eye-tension by a lessening of the bulk of the vitreous; and I have so often found the eye inclined to softness in cases of detached retina, that it seems to me fairly supposable, that serous effusions also, are often due to this cause.

On the other hand, in one very interesting case, which I shall relate, a rather exceptional increase of tension to the first degree, T 1, occurred in connexion with subretinal effusion. I can only recall three or four cases in which any tendency to increased tension has been met with in my own experience.

When I first ventured to operate in cases of detached retina, I only entertained faint hopes of arresting the spread

of the disorganisation, by opening a permanent way of escape for the fluid into the vitreous cavity; and when a positive, and sometimes a considerable amelioration of sight took place, even in those parts of the field corresponding unequivocally to detached portions of the retina, I was not less surprised than delighted.

An examination of the fundus of the eye has often corroborated the fact, already observed by von Graefe and others, that a part of the retina actually raised from the choroid by fluid, may retain a certain degree of perceptive power. Where the vision has much improved in consequence of an operation, I have found satisfactory changes in the ophthalmoscopic appearances of the improved part, not indeed a return to a perfectly normal state, for the retina remains as if swollen by water, or seen in a watery medium, but a replacement of the elevated portion into apparent apposition to the choroid. Retina raised, but not floating or thrown into visible folds, has often a very peculiar appearance under the ophthalmoscope. For this purpose, I use the coronal flame of an Argand gas-burner, which is seen as a milky-white circle wherever it falls on retina so affected. I am not certain on what precise condition this appearance depends. The retina may seem œdematous and swollen without exhibiting it. I think it depends on a certain elevation of the membrane from the choroid, together with a comparatively unaltered state of the retinal tissues, and that where it exists there is a prospect of improvement of function on replacement. This I suppose to be impossible when the detached retina has become opaque.

With regard to the questions of a physiological nature opened by the fact of this retention of perceptive power in portions of retina separated from the choroid, it seems certain from what we know of the layer of rods and bulbs (which we suppose for many good reasons to be the immediate recipient of the luminous impressions),* that these anatomical

* See Donders, on the Anomalies of Accommodation and Refraction of the Eye. New Sydenham Soc., vol. xxii. Introduction.

elements are not at once, or necessarily, broken up by the contact of the fluid, or by their disruption from the choroidal epithelium. For the improvement of sight has been in several instances extremely rapid, almost immediate, after my operations, and before any reproduction of these elements could have occurred, even if that were proved possible. It is obvious that this immediate recovery must be chiefly due to the restoration of the retina into its true focal position, and to the unravelling of its eclipsing folds; but I am speaking of the share taken by the layer of rods and bulbs, independently of the other layers. That these delicate structural elements are not prone to undergo degenerative changes may be inferred from their being often found little altered in blind glaucomatous eyes, when all the other retinal tissues are more or less spoiled, a fact I ascertained many years ago, when excising such eyes. The fluid effused has been always apparently clear, generally more or less yellowish or serous, at other times colourless, like water. I have several times collected enough of it to demonstrate to the students at the moment, by heat or nitric acid, that it contained albumen. Sometimes it has become only very slightly turbid under these tests, but when most yellow in colour, the albumen has been in sufficient proportion to render the whole opaque. If in any case the fluid be without albumen, it would at all events probably contain saline matters, and would hardly be of the tenuity of the aqueous humour. If mere water, it would of course disintegrate the rods and bulbs, as water does out of the body, and this it does not appear to do.

The rods and bulbs being thus regarded as, at least often, not structurally impaired by detachment, we may infer with much certainty that even a slight elevation of the retina from the choroid would alter the normal vertical position which we may regard as so essential to their perfection, as recipients and isolants of the pencils of light making up an image. If thrown irregularly into sloping positions, like corn beaten down by the wind, a single pencil of rays would fall through a portion of many of them, and each element

would receive light from many pencils, with corresponding confusion of perception. Moreover no element would receive its light in that vertical direction for which it is fitted, and additional confusion might arise from disturbance of the natural absorption and reflexion by the choroidal epithelium.

These remarks would apply to very slight variations in the inclination of the rods and bulbs, and may even be regarded as not altogether inappropriate to explain in some measure the feebleness of retinal power in high degrees of myopia without detachment, where probably, in addition to the opening out or expansion of the retinal structure due to the yielding of the eye-coats, and which would involve its own proper enfeeblement of sensibility by lessening of the number of retinal elements in a given space, there would probably also be some sloping of their lines of direction.

In all my cases the ophthalmoscope has previously shown the position of the effusion, and, of course, at the same time indicated the seat for operation.

Atropine has been often used for ophthalmoscopic examination previously, but as the pupil is often large, it is not always required for this, and it, in some measure, prevents exact examination of the acuteness of vision immediately after operation. I have not used it for the purposes of the operation, as I have been guided in the directions given to the needles altogether by that of their handles outside the eye, but it is possible that attempts to direct their movements by the ophthalmoscope through the pupil might succeed. I know my friend Dr. Bader has done something of this kind with the ingenuity which distinguishes him. Of course, however, such a method would have its own peculiar risks of wounding the lens. It would be almost essential that the direct image should be employed, and the operator must have the most perfect reliance, not only on his own dexterity, but on the self command of the patient, for it would not then be so easy to use chloroform.

I have operated generally without chloroform, sometimes with it. The patient has been lying or sitting with the head

thrown back. I have never used a knife, but only fine lance-pointed needles, such as we use in cataract operations, the puncture made being very small.

The punctures have been always made through that part where the effusion was supposed to lie, and almost always some fluid has escaped at the time under the conjunctiva, sometimes outside it; occasionally, when none escaped at the moment, the subconjunctival tissue near the orifice was seen to be œdematous shortly afterwards, apparently from an oozing of the same kind; occasionally such an escape continued even for several days, but usually the œdema round the puncture had disappeared the next day.

Although the eye-tension was generally not more, but even rather less than normal, the subretinal fluid commonly escaped outwards rather promptly, so as often to raise a small abrupt swelling immediately about the needle. In the course of half-an-hour this has diffused itself over the neighbouring areolar spaces. This readiness of escape under normal or slightly minus eye-tension, would, of course, occur when an outlet was provided, just as the aqueous humour would escape under a puncture of the chamber. It occurred with less force when chloroform was used, the muscles of the eye and lids being then quiescent, and compression from that source removed. It illustrates the reaction of the coats of the eye on the eye-contents under normal or even slightly minus conditions of tension. The eye immediately afterwards has always been softened to the degree — T1 or — T2; corresponding to the amount of fluid withdrawn. This minus tension variously continued one, two, or three days, apparently according to the time when leakage through the punctures into the subconjunctival tissue ceased. The T afterwards usually resumed its previous degree.

The puncturing was not commonly painful, except when it was necessary to hold the eye with forceps to guide the direction of the needle so as to avoid the lens. All pain ceased immediately the operation was over.

After the operation the globe, becoming somewhat re-

laxed by the oozing of fluid, is apt, for a time, to have "lightning flashes," "momentary coruscations," like "sheet lightning," &c. These occur when the eye moves, and are probably due to the bending of the retina by the traction of the external muscles on the eye-coats. Or they may be due only to the alterations going on in the position of the retina, as the fluid changes its place. They are to be distinguished, I think, from another sort of photopsia, which belongs to changes in the tissues of the retina itself under the same causes which produce the effusion. The retina sometimes is sparingly speckled with ecchymoses, independently of the operation; and such photopsias not unfrequently attend the affection at the first.

The region of the eye actually punctured has varied, but it has usually been from a quarter to half an inch behind the cornea, and between the recti tendons. The effusion was generally seen to be spread over such an area that a choice was left, and I preferred passing between rather than through the tendons of the recti. The needle was always thrust vertically in towards the centre of the globe, being thus turned from the situation of the lens. In no case was the lens wounded, nor do I regard it as in any danger when the operator has presence of mind, and keeps its situation in view while the needle is in use, and especially if the eye rolls. I avoid the use of the forceps, if possible, and do not find them very necessary.

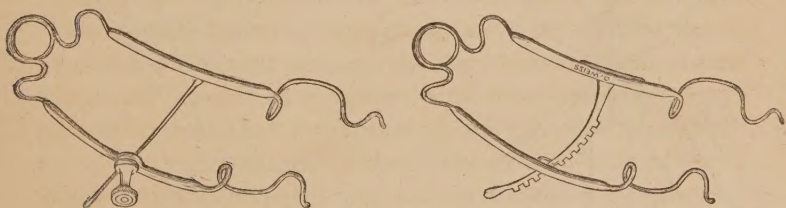
Where an opening is made in the retina of course the retinal tissues in that part are sacrificed. This is a small matter if it be the means of saving sight in other parts, or averting total blindness. But if, in a part of the field, there is already, before the operation, total absence of perception of light, I select the corresponding part of the retina for operation, so as to entail no unnecessary sacrifice. But, in truth, the sacrifice of an eccentric portion of the retina, especially if near the front, is of trivial importance in any such case, and the gain of extent of field has often, even generally in recent cases, greatly exceeded the loss.

In my first operations I conceived it desirable to use the fine needle only as a puncturer, introducing it at one or more points in succession as seemed best. Sometimes no serum escaped outwardly at the first puncture, and there was a doubt whether the right site had been hit upon. I then, on a second puncture near the first, got evidence of effusion. I thought it likely, in the case of a limpid effusion on so small a scale, when the difference of pressure on the two sides of the retina was so trivial, and when all we wanted was to establish a permanent orifice of communication, however small, that one or more needle punctures might suffice. But von Graefe's view of the desirableness of a freer orifice may be correct. Experience must determine this. Another reason for employing a needle instead of a knife was as far as possible to avoid the division of any artery or vein of the choroid, for it seemed probable that in a case where the eye was at first slack, or became so on the puncture, any blood from such a wounded vessel, even though very small in quantity, would be likely to flow inwards as easily as outwards, and so complicate the operation unnecessarily. Von Graefe does not notice the occurrence of any bleeding in the use of his cutting instrument, which, of course, made a small incision rather than a puncture, so that probably this apprehension on my part was groundless. Nevertheless, it still seems to me, that if the object can be attained by needles they are to be preferred to a cutting instrument. To avoid subconjunctival ecchymosis, the needles, on being inserted, should be introduced between any visible vessels.

Having observed a recurrence of the symptoms in a case in which needle punctures had already been made with only temporary benefit, and having understood that von Graefe had employed the knife with the intention of cutting a free opening in the retina, I considered whether two needles might not be employed for dilaceration of the detached retina, on somewhat the same principle as in the case of opaque capsule in the pupil, that, viz., of introducing each separately through it, and then tearing it open by

suitable movements of one needle on the other, by crossing or separating their points. I have endeavoured to carry out this idea on several occasions and in several ways, keeping in view in each instance the probable distance of the summit of the detachment from the choroid; in other words, the extent of projection of the retina towards the centre of the vitreous, as observed by the ophthalmoscope.

The diagrams will explain my meaning. The continued lines show the first direction of the needle, and the dotted lines the second direction, when it has been turned on its point of passage through the sclerotic. The spherical curve shows a section of the sclerotic and choroid, the undulated one a section of the detached retina. The sections are imagined to run through the equator, and the needles to work in that plane. Of course this would vary in actual practice, and usually the needles would be introduced in some part of the anterior hemisphere, and their points would then be directed in the first instance rather backwards towards some part of the plane of the equator, so as to keep away from the lens region. In introducing two needles, and even in simple puncture, it is well to use either Dr. Bader's or my own stop wire-speculum, with screw or rack, as in the Figures.* This



effectually prevents the pressure of the globe by the lids. I sometimes fix the globe with the forceps on introducing the first needle, which afterwards becomes a sufficient holder in itself. The surgeon must be careful, if the globe rolls, to keep the needles in their true position as regards the lens.

* I give a figure of this latter as it may not be generally known. The screw for fixing is now replaced by a rack.

In Fig. 1 a single needle is represented, vertically inserted. If two needles are used simply in the way of puncturing, it may be well to introduce the second before the first is withdrawn, before the globe slackens by any escape of fluid from the first puncture.

In Fig. 2 two needles are in use, introduced at some distance apart, and so directed as to pierce the retina as near as may be at the same point.

In Fig. 3 two separate needles, made to fit against each other by their handles, are shown in two positions. They

Fig. 1.

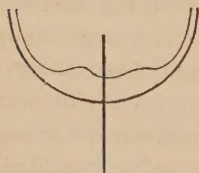


Fig. 2.

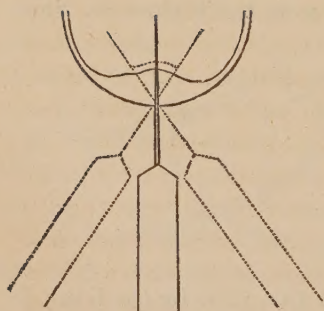
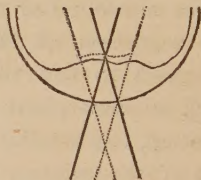


Fig. 3.

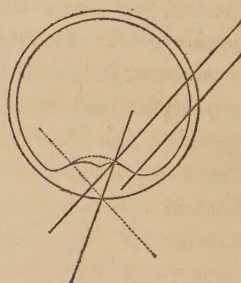


Fig. 4.

are introduced as a single instrument, and their handles are then separated. Each turns on its point of penetration, and of course their points diverge in an opposite sense to the handles.

By thus running one or two fine needles as far as the

centre of the globe, or further than the centre, through the region where the detachment lies, we may be quite sure, I conceive, of penetrating the retina. It can hardly recede before the point of the needle, so as quite to elude it. The needles enter it from without inwards. But it is possible, delicately hung as the retina is in its false situation, that as the needles are assuming their second position, it may run down on their stems, or some fold in it may be opened out, and thus it may escape laceration. This may happen if it be much folded, or if the needles happen to have penetrated near each other, but with a fold between them; for, of course, the precise details must be accidental; we cannot, under any circumstance hope to have them exactly in view. This may, perhaps, be particularly liable to happen, if the retina be much detached, with ample folds, but not very much thrown inwards. It would be less likely to occur when the separation was not considerable, though in proportion to its nearness to the choroid, would the opening effected by the movements of the needles be less. The further apart are the points of entry, the more chance there would be of making a wide opening.

This apprehension lest the retina might slide down the stem of the needles towards the point of entry, and thus elude rupture, has led me to try another method, Fig. 4, that of introducing one long needle at some distance from the part of the retina to be lacerated, and pushing it either near to or through the sclerotica in the region of the detachment, thus piercing the retina there from within outwards, so as to secure the penetration of the detached portion, and give a fixed point for the second needle to work from. The second needle is then introduced in the region of the detachment from without inwards, its point being directed towards the presumed situation at which the first needle has pierced the retina, and this second needle is then moved upon the first. If the point of the first needle remains within the eye, not transfixing it, it should be held stationary, lest it should scratch the choroid.

What I have now said represents my present views, which I offer with diffidence, as only hints to be further worked out by experience.

We may suppose that laceration by needles may have this advantage over division by the knife, that it could hardly wound any retinal vessels; the retina would tear where it offered least resistance, *i. e.*, in the vascular areolæ. Near the front, however, where these operations are usually practised, the vessels are the smallest. It is possible in the case of detachments in the posterior hemisphere, which it might be desirable to operate on, that cutting from within outwards, and perhaps with the direct aid of the ophthalmoscope, may hereafter be found the preferable method. It is then less easy to manipulate the needles inserted in the region of the detachment, owing to its deeper situation. Yet, under chloroform, and with the globe rotated by forceps, the hinder part is not so inaccessible.

In several cases, where the immediate improvement in vision made it pretty certain that the retina had been opened by the needles, I failed, like von Graefe, to discover the opening by the ophthalmoscope. In three instances it has been plainly visible, of an angular shape, and the retina near it has exhibited small folds of an unusual appearance, as though the membrane had retained, in some degree, the wrinklins impressed upon it by the needles at the moment when the laceration was effected.

As to the results of my own cases, which include examples of the disease at almost all stages of its progress, some early and partial, others advanced and widely extended, I am unwilling by any general deductions from so small a range of facts, to anticipate the future. So far as they go, however, they seem to justify the following remarks.

Like von Graefe, I can say I have never in any case seen serious harm done, such as caused me to regret the operation, either in the way of vision, or of inflammatory trouble.

In some cases very decided improvement of sight has

occurred, both as to the extent of the field, and the acuteness of perception, sometimes in a few minutes or hours, at others within a few days.

In some cases the improvement has been very slight,—a little enlargement of the area of the field, better perception of objects under the same degree of illumination as before. In others again, there has been no improvement whatever; in others still the loss of sight has ultimately proved as complete as if no operation at all had been performed.

As to permanence of results, the cases show so far something that is satisfactory. The improvement has been maintained in some for two years, and up to the time when they were last seen. In others there have been relapses, for which second or third operations have been done with variable effect.

In estimating these facts, the variable course of the disease, where no operation is performed, must be borne in mind. Nothing but a more extended study and trial can settle the degree of advantage to which the operation can fairly lay claim. Meanwhile it must be remembered that the disease has hitherto been generally regarded as desperate, leading in almost all instances sooner or later to complete blindness, and that even if some may think other than operative treatment to have any efficacy in arresting the extension of the mischief, such treatment would not be precluded by the operation, while it could hardly be deemed by any to offer the slightest hope of replacing the detachment. In fact, either the disease has usually a local origin in a previous condition of the organ, myopia, &c., or it occurs without any apparent cause in persons without definite general disease, or it comes on in connexion with long weeping or depressing causes, which do not admit of immediate removal, and the removal of which, were it feasible, would hardly restore or improve the condition of the retina.

Hence in the present imperfect state of our knowledge, I am favourable to the trial of some such mode of operation as that I have suggested. It has proved harmless in all cases,

beneficial in several. And I am encouraged to go further than von Graefe, and to advise that it should at present be performed whenever detachment exists, inclining to spread, and when there remains some vision to be saved. Particularly I should perform it when the retina presents the bluish white, milky aspect, where the image of the light falls upon it, which I have mentioned above, at page 135 ; because then there is less damage already done, and more chance of replacement and recovery of functions. If it is to be attempted at all, it seems reasonable to perform it *early*, that the chance it affords of putting a limit to the spread of the effusion, may be given when its value will be greatest. It also seems reasonable to perform it on an eye whose fellow is still unaffected, not only on the principle that we ought to try to save all the sight we can,—not knowing when what is lost may come to be regretted,—but also because detached retina so often occurs in *both* eyes, that we may even expect the arrival of such regrets with some degree of probability. I say nothing at present as to the disease in one eye possibly influencing the other by sympathy. That question is a very difficult one to handle, and is full of ambiguities. But that it admits of being fairly raised may add an argument in favour of interference.

Of course, whether operation be had recourse to or not, no prudent surgeon would neglect whatever may seem rational in the way of other treatment and management, for an operation need in no degree interfere with this.

Von Graefe has noticed the vitreous humour to become clouded after some of his operations, and I have observed the same thing—not by any means constantly, or when the evidence of an opening having been effected in the retina proved the most satisfactory. He supposes it, as I understand him, to arise from the admixture with the vitreous of the clouded sub-retinal effusion, and it may be so, though the effusion which has escaped at my punctures has always seemed transparent. But some turbidity might result from the admixture of even a transparent effusion with the vitreous, by the sub-

sequent precipitation of particles, and this perhaps is his meaning. Such cloudiness of the vitreous, however, is apt to attend subretinal effusions, even when there does not appear to be any rupture of the retina, any orifice of communication. It may naturally result from an extension to the hyaloid surface of the ciliary body, or to the retina itself, of the same morbid process which furnishes the sub-retinal fluid. When it occurs after an operation, it may be explained by the vascular reaction following the operation, trivial though it be, as easily perhaps as by the admixture of the fluids, so that I should be inclined, where the repetition of a puncture seemed desirable, to defer it until all irritation from the previous one had entirely subsided. In particular, where the eye continues for a few days a little softened by the oozing of fluid outwards, and it remains slightly tender, and its sclerotic vessels a little congested, I should postpone any second interference until this had quite ceased; for it seems obviously imprudent to run any avoidable risk of exciting an eye already so seriously affected. I may say, indeed, incidentally, that I had expected, *à priori*, that such eyes would be prone to vascular reaction on the slightest provocation, and on this account also I used the finest needles. But on the contrary, experience proves that they are singularly tolerant of such small punctures or wounds as have been made.

In a few instances vision has seemed so far deteriorated by the operation, as that its acuteness has been lessened; the patient has not been able to read the same type as before. But I think in no such case has this proved permanent; either a subsequent improvement has taken place, at least for a time, or where the acuteness in the direct line has remained somewhat lessened, the field has widened, and there have been evidences in the greater uniformity of sensibility under varying intensity of light, and in the patient's own impressions as to the usefulness of his sight, as well as in the ophthalmoscopic observation of replacement, that the retinal condition has improved, or at least not become worse. A more hazy

state of the vitreous humour has then seemed to account for this: an explanation borne out by subsequent amelioration accompanying a return towards a clearer state of this humour.

On the whole I may remark with regard to this interesting and important subject, that nothing should be undertaken in it except with the greatest caution, and after the most careful and exact diagnosis possible; nor until the severity of the disease and its probable eventual issue in blindness, if left to itself, the incompleteness of our present experience, and the great uncertainty whether any operative interference whatever will, in the individual case, even at all arrest further decay of sight, have been explained to the patient or his friends. We shall be justified, I think, by the facts already observed, in explaining, where suitable, the object intended by an operation; that it is slight, that it has not been observed to be followed by any dangerous complications, and that in some instances it has very certainly improved vision, even in a somewhat lasting degree. No doubt every thoughtful practitioner will be influenced in his prognosis by such considerations as the following:—Whether the detachment is already large, or the retina already exhibits extensive evidences of tendency to further detachment; whether the vitreous is already cloudy; whether the assumed local or general predisposing causes of sub-retinal effusion are strongly marked; or whether the patient has for some considerable period been in a stationary condition as regards sight. He must beware, in justice to himself and out of regard to his usefulness to others, of committing himself to any hopeful prognosis, yet I know of no reason why he should not follow in this instance, as in all others, the golden rule; or shrink from the responsibility resting on him, to do for his patients, should they so desire it, what, with the knowledge he possesses of their malady, he would be disposed to ask a skilful friend, in like circumstances, to do for himself.

Since the above was in type, I have seen a trocar used

by Dr. Wecker, of Paris, for puncturing the retina, and, after withdrawing the fluid from the subretinal space, for tearing open the retina where it traverses it. It is introduced from the opposite side of the eye.

A trocar, however, seems a disadvantageous form of instrument for penetrating the coats of the eye. As the sclerotic resists its passage it compresses the globe before entering, and then often enters with a jerk, and the eye being then apt to roll, it may take a wrong direction. It also seems better to tear open the retina by two instruments of the finest size, if they can effect the laceration, as I believe they can. It must often be doubtful, too, how far an instrument inserted from the opposite side should be thrust in order to reach the detached retina; and some vitreous humour, instead of subretinal fluid, might be drawn off through it if it stopped short of the retina, which would be a disadvantage. I have only twice seen a little vitreous humour escaping under the conjunctiva in any of my operations, and then it was very thin, and must have come across the subretinal space. In such cases the sub-conjunctival swelling is firmer and lasts longer than when it is caused by mere serosity. Moreover, it is yet very doubtful whether the withdrawal of effused fluid from the eye is attended with any profit. I am not prepared to deny that it may be; but to withdraw fluid has not been the object of my operations, and von Graefe seems even to wish to avoid it. However, it has been almost always an incidental effect of the method of procedure which I have adopted. And as for the laceration of the retina, the trocar passed at one point through the retina, and then turned on its point of transit through the sclerotica, might apparently fail to tear the membrane, and might even perhaps drag it more from off the choroid. Hence I should be more disposed to use the needles as above.

[To be continued.]

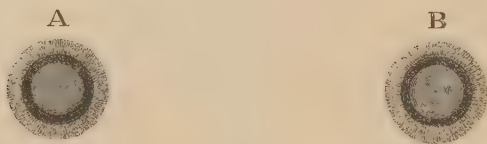
A CASE OF CONGENITAL CATARACT TREATED BY IRIDESIS IN WHICH SOME MODIFICATIONS WERE INTRODUCED IN THE OPERATION.

BY G. CRITCHETT.

IN some practical remarks that I published upon Congenital Cataracts in vol. 3, No. 1, of the Ophthalmic Hospital Reports, I mentioned some cases of nuclear cataract treated by iridesis, in which the result had been sufficiently favourable to justify further attempts of the same kind. Cases of a similar nature treated by iridesis have also been published by Mr. Bowman, Hulke, Pagenstaker, and others, showing favourable results. Iridectomy has also been employed in similar cases by von Graefe. It becomes an interesting practical point to determine whether the formation of an artificial pupil in nuclear congenital cataract places the patient in a more advantageous position than if the cataract were removed, and if so, whether iridesis or iridectomy is the more useful operation. It is also necessary to ascertain, as precisely as possible, the limits and exact conditions under which the method of proceeding is indicated, rather than the somewhat more severe and radical method of removing the cataracts. I am induced to bring the following case before the notice of the profession, because it presents some points of peculiar interest, and because, in the course of the treatment adopted, it brought out some important practical results, that may be of use in determining the questions to which I have in the above remarks drawn attention. Early last year, 1863, a young gentleman, the son of a clergyman, æt. 22, consulted me respecting his sight. The account that he gave of himself was as follows—I quote his own words:—"As far back as I can remember I have been conscious that my sight was defective, that of the right eye has always been the worst, indeed I cannot recollect that the right eye has ever been of any use to me. I knew my left to have been always defective from the fact of never having been able to distinguish the features of any person with their back

against a strong light, the face of a person so placed having always appeared to me perfectly black. I noticed the same effect in looking at a powerful lamp, beyond which I could see very little without shading my eyes with my hand. In the dusk while walking I frequently ran against objects, and a street lamp only made the surrounding gloom to appear deeper. I was also unable to measure distances, or see objects approaching in the twilight. When I was about twelve years old, a film was for the first time observed in both eyes, that in the right eye being more distinct than the left. This had doubtless existed since childhood, and had become gradually more evident, and was at last accidentally observed. For two years after this, by the advice of an oculist, all study was given up, and I was turned out on a farm. At the end of that time I again resumed my studies. Each year I found that I required a more powerful light. The invention of moderator lamps proved a great boon to me, but the effect of even these powerful means gradually wore off in time, and as years passed on, I was reduced to guessing a good deal at words, especially in an imperfect light, for I found that I frequently mistook a strange word, unless I spelt it over with great care. But the progress of the cataracts had been so gradual that my sight had become highly educated, and after residing three years in Oxford, I took my degree without difficulty, though at times I suffered great inconvenience, both in the lecture room and at examinations, from want of light." Such was the account that I received from this young gentleman when he first consulted me, and which I have copied from his own written statement. On examination I found that the right eye was useless to him; it could only perceive dim outlines of objects, and there was divergent strabismus of that eye to the extent of about three lines. On dilating the pupil fully with atropine, rather more than the nuclear half of the lens was found to be opaque, and of a dense greyish white colour, the margin being perfectly transparent. Through the transparent part the fundus of the eye could be readily seen with the ophthal-

moscope, and appeared quite normal. When the pupil was thus dilated the vision was restored to a remarkable extent. Although the eye had been so long disused, and was so very imperfect during the contracted state of the pupil, yet as soon as it became fully dilated, he could read No. 4 of Jaeger, and he stated that his sight was brighter and clearer than he ever remembered even with the left eye, both for near and distant objects. With the left eye he could read slowly and with difficulty, and by the aid of a strong light No. 8 of Jaeger, at a distance of about 5 inches. His perception of large objects also was misty and indistinct beyond a range of 2 yards. Under the influence of atropine, a nuclear cataract could be seen of the same size as that in the right eye, but of a pale grey colour, and much less opaque. The margin, like that of the right eye, was perfectly transparent (see Figs. A. B). Vision was not improved in the left eye, but on the



contrary rather impaired and confused by the action of atropine. This young gentleman was anxious to enter the Church, which he felt to be impossible under existing circumstances; he had also a strong impression that his sight was becoming worse from month to month. He was anxious to avoid, if possible, the necessity of wearing strong convex glasses. Under these circumstances I determined to perform iridectomy. Early in April, under the influence of chloroform, I made an artificial pupil inwards in both eyes by iridectomy (see Figs. C. D). The effect of this operation was in some



respects curious and interesting. Sight was so far improved in the right eye, that he could read No. 4 of Jaeger fluently in a good light; he could also see distant objects well. It was curious also that in reading he obtained binocular vision. The right eye, which in repose remained divergent to the extent of three lines, might be seen to travel inwards, so as to converge accurately with the left as soon as he directed the eyes upon a minute object, as in reading, but when looking at distant objects there was double vision. This seems to prove that the divergent strabismus was caused by the defective vision; that under the stimulus of the focussing effort, the internal rectus was able to reassert its preponderating power, and overcame even an extreme degree of strabismus, but that in looking at distant objects, and when the focussing effort was but feebly exerted, the external rectus still possessed too much influence, and produced double vision; the only defect that remained in the right eye was a feeling as if more light were wanted in the eye, and considerable difficulty in seeing small objects when the light was rather subdued. The effect of the operation upon the left eye was less satisfactory, as might have been expected. There was some confusion and distortion of minute objects, the power of reading with it was not so good as before the operation, and even distant objects were indistinct. When, however, the two eyes were used together, the power of reading was good, far better than before the operation, and in looking through a telescope with the left eye, vision was quite distinct.

In July I again saw my patient, the sight of the left eye had improved, partly perhaps by practice, and partly because the nucleus of the lens had become denser. The sight of the right eye remained the same. There was still double vision for distant objects, and a strong desire for more light in the eye. As my patient was very accurate in all his observations, and intelligent in his suggestions, I determined to endeavour to remove as far as possible the inconveniences of which he now complained.

About the middle of July he was once more placed under the influence of chloroform. I then proceeded in the first place to divide the external rectus muscle of the right eye subconjunctively; I then performed a second iridectomy in the same eye in such a way as to enlarge the pupil and alter its shape, giving to it a crescentic form, with the two cornua of the crescent cut off (see Fig. E). The effect of this operation was very satisfactory; double vision and all tendency to divergent strabismus were removed, more light was admitted into the eye, the patient could see better in a subdued light, and retained quite as accurate vision, both for near and distant objects, as before the second operation—in fact rather better. The right eye was now, in all respects, decidedly the best of the two.

I again saw my patient in October. The right eye had retained all the advantages gained by the last operation, and had even somewhat improved by use. The left eye remained about the same. There was some confusion, except when the light was very strong, and there seemed to be less light admitted into the left eye than into the right. Under these circumstances, encouraged by the success that had followed the enlargement of the pupil in the right eye, I proposed to my patient a similar proceeding in the left, partly with a view of admitting more light through the transparent margin of the lens, and partly to cover, if possible more of the semi-opaque nucleus. I performed this my fourth and last operation under chloroform, and succeeded in both these objects (see Fig. E). A fortnight after this operation he was able to see rather better with the left eye than the right, and as the opaque nucleus gradually increased in density the distinctness in the outline of objects was brought out more vividly, though of course with both eyes he sees better than with either one employed singly. He now can read No. 1 of Jaeger at 5 inches, and No. 16 at 20 inches. His sight for small print is slightly improved by a weak convex glass, and for distant objects by a weak concave, but he rarely employs either. He writes me word that he

was ordained in December last, and that he is able to perform all his clerical duties with ease and comfort, though he still is somewhat at a loss when the light is feeble.

This case helps us in determining some important practical points. 1st. It shows that the nucleus of a congenital cataract is liable gradually to become more opaque, although the marginal portion may retain its transparency. 2ndly. That divergent strabismus results from defective vision, and from the non-exercise of the focussing power; that it will subside in a great measure on the restoration of sight, and that it may exist where the retina is quite healthy. 3rdly. It shows that the artificial pupil should be of a sufficient size, at least equal to the area of the natural pupil, though necessarily of a different shape. 4thly. It proves that a semi-transparent state of the nucleus causes some confusion of vision, by allowing rays to pass with a different degree of refraction, and that the more this can be covered, the better the result will be. 5thly. It suggests that there should be sufficient clear margin to ensure an artificial pupil, at least equal in its area to the average size of the natural pupil, and that where suitable cases are selected as good a result may be anticipated as where the cataract is removed. 6thly. It may be observed that four operations were performed without the slightest reaction. The eyes being on each occasion fit for use in a few days. This is the usual experience of this operation, it may therefore be regarded as a far safer proceeding than the removal of a congenital cataract in an adult.

I consider the performance of a second iridesis as a valuable modification of the original operation in certain cases, and a preferable proceeding to iridectomy in cases of congenital cataract; it enables us to limit and define the pupil more accurately, and to draw the iris more completely over the nuclear portion of the lens, so as chiefly to expose the transparent marginal part. The arguments against the performance of this operation, as contrasted with the removal of the lens, seem to be the possibility of the marginal part of

the lens becoming at some time or other opaque ; the altered and deformed shape of the pupil, and the limitation in the amount of light admitted into the eye ; and the question whether vision is ever quite as good as after removal of the lens, in consequence of the imperfect refractive power of the margin of the lens and cornea, as compared with the centre. The chief arguments in its favour are its greater safety and the avoidance of the necessity for using powerful lenses. Each individual case must be judged by its own special merits. The surgeon must weigh the respective advantages and disadvantages, he may even leave the choice in some measure and in some cases to the patients, and it is possible that the case I have related may assist him in forming his judgment.

As I have introduced some slight modifications, both as regards the steps of the operation of iridesis, and the instruments employed since I first described it in this Journal, I think it may be useful if I briefly detail my present method of proceeding in cases such as the one I am now describing. The patient having been placed under the influence of chloroform, the eye is exposed by means of a wire speculum, to which a stop is introduced, so as to regulate the degree to which the lids are separated, and thus to prevent a constant strain upon them. As the most advantageous position for the artificial pupil is inwards towards the nose, the eye must be held firmly outwards. I then introduce a broad needle curved at an angle, upon the flat, just at the point of junction of cornea with the sclerotic, slightly encroaching upon the latter. A small loop of fine black silk is then placed over the opening that has been made. A fine blunt hook, made of silver, so as to allow of being curved conveniently for entering at the nasal side of the eye, is then passed through the loop of silk and the opening into the anterior chamber to the margin of the pupil, which is thus drawn out through the opening by means of the hook. An assistant then seizes each end of the loop of silk with small broad pointed forceps, and tightens them carefully, so as to enclose the portion of

iris that has been caught in the hook and pulled out; care should be taken to include the iris only in the tie, and not any of the conjunctiva, as it detaches more readily. Some little management is also necessary in bringing the hook out through the small wound, otherwise it is apt to entangle itself in the opening as it is drawn out. This is done by turning it on the flat as it emerges. In the course of two or three days, the little knot of silk, together with the portion of iris that has been included in the ligature, drops off. If this do not occur, it may be lifted off with a pair of forceps.

In performing a second iridesis, as I did in this case, at an interval of three months, a method of proceeding similar to the former must be adopted. The opening must be made through the junction of the cornea and sclerotic, about $2\frac{1}{2}$ lines from the previous one, and the hook must be introduced round the edge of the previous artificial pupil, so as to draw it out in such a way as to alter its shape (see Figs. E. F).



The effect of this is to enlarge the pupil in one way, and expose more of the clear margin of the lens, and diminish it in another, so as to cover more of the opaque part of the lens. The chief points requiring care in the operation, are: 1st. The size and position of the opening, in front of the ciliary attachment of the iris, but not through the transparent cornea, and just large enough to admit the hook. 2ndly. The hook must be carefully made, round and smooth at the end, so as to prevent the possibility of injuring the capsule of the lens, and after it has entangled the margin of the iris some management is required, as already stated, in causing it to emerge readily through the small wound by which it has entered; this is done by some careful rotation. 3rdly. It is important to draw the hook, together with the iris that is held by it, completely out through the wound as far as is

practicable, without detaching one from the other. In drawing the ends of the silk tight, care is required to keep them on a level, and in an exact line with the portion of iris that is to be ligatured, otherwise it may be torn away, and thus the object of the operation may be frustrated. A little care is also required in detaching the hook after the prolapsed portion of iris is strangulated ; it must be carefully unhooked, as it were, and not forcibly dragged away.

A TABULAR REVIEW OF 106 CASES OF SQUINT TREATED BY
OPERATION. WITH REMARKS.

BY J. W. HULKE.

LAST summer, on my vacation tour, I was asked by an old ophthalmic surgeon of great reputation, "What do you honestly think of the operation for squint?" The same question had been put to me many times before by practitioners less familiar with eye-disease, for the strong reaction which followed the indiscriminate division of the ocular muscles when this was introduced as the cure for squint, still lingers with many persons who have not acquainted themselves with the advances which have been made in the pathology of squint, more particularly by v. Graefe, and quite recently by Donders, and with the improved methods of operating now in use. This led me to analyse the cases of squint operated on, of which I have preserved notes, and I now offer the following tables as a small contribution to the statistics of strabotomy. They comprise 100 cases of convergent, concomitant, congruent, and 7 cases of divergent squint.

In the convergent, concomitant, congruent form of squint (hereafter, for shortness, designated Str. C. C.), instead of both sight-lines intersecting in the point of the object at which the squinter looks, one sight-line* alone cuts this

* The sight-line is the straight line that connects the yellow spot and the object directly seen.

point, that of the eye which is, as we say, straight; whilst the sight-line of the other eye moving inwards, passes the object, and intersects the sight-line of the straight eye at some point between it and the object, and this eye squints. If the straight eye be covered in such a manner as to intercept its view, the eye which before squinted moves outwards from its inverted position, until its sight-line cuts the object, and this, in turn, becomes the straight eye. Whilst it effects this by the contraction of its previously relaxed outer Rectus muscle, simultaneously the covered eye (its inner Rectus contracting with its associate muscle the outer Rectus in the other eye,) moves inwards, till it in turn deviates as much as the originally squinting eye. This deviation of the covered eye, termed the secondary squint or deviation, equals in extent, or is congruent with, the extent of the primary deviation.

If whilst the sound eye is covered the movements of the squinting eye are tested, it will be found that its cornea cannot be turned quite so far outwards as that of the sound eye, but, on the other side, it can be turned further inwards, so that the range through which it can be moved is undiminished; it is, as Prof. v. Graefe expresses it, as if the entire arc through which it can travel were shifted slightly inwards.

Lastly, when both are uncovered we notice that, making due allowance for the extent of the deviation, the squinting eye rightly accompanies the movements of the sound eye, or is concomitant with it.

The extent of the deviation or size of the squint, should always be noted, because it regulates the method of operating suitable in each case, and because it enables the surgeon to estimate very exactly the effects of his operation.

Mr. Bowman, I believe, does this by recording the distance between the outer and inner border of the cornea, and the outer and inner commissure of the eyelids respectively, or between the vertical meridian of the cornea and the lower lachrymal ^vunctum, in the form of a diagram; but I find

v. Graefe's method so handy, that I always use it. It has, moreover, the convenience of numerical expression. An ink dot is made on the lower eyelid of the squinting eye, at the point where this is cut by the vertical meridian of the cornea when the sound eye looks at a distant object right in front. The straight eye is then covered, and the patient is directed to fix his squinting eye on the object; this eye now moves outwards, and a second ink dot is made where the vertical corneal meridian cuts the lower lid. The separation of the two dots expressed in lines ($\frac{1}{12}$ of the English inch), is the size of the squint. This separation may be measured with a small ivory rule, but practice soon enables one to estimate it sufficiently accurate without it.

In 50 cases I practised the operation in general use by my colleagues which I shall distinguish as "the Moorfields' operation;" in the remaining 49 I adopted the operation described by v. Graefe.

In the Moorfields' operation, the eye-lids having been separated with a spring speculum, the assistant turns the cornea outwards, seizing, for this purpose, the conjunctiva boldly, close to the outer border of the cornea, with a rats-toothed forceps. The operator seizes, with a similar forceps, a small fold of conjunctiva, nearly midway between the inner edge of the cornea and the caruncle, just over the lower border of the tendon of the Rectus internus, and snips it with slender blunt-pointed scissors, so as to make a small horizontal incision. The fascia, which this incision exposes, is in turn snipt through. Next a blunt hook, with rather a large curve, is passed through the wound beneath the tendon, which is put on the stretch by slightly raising the hook, and divided with small snips of the scissors between the hook and the sclerotic.

The advantages claimed for this operation are those which it possesses in virtue of its subcutaneous character, and the absence of that recession of the caruncle and undue prominence of the eyeball which are not infrequently observed where the conjunctiva has been freely divided.

I believe that these advantages are gained where care is taken to keep the conjunctival wound small, where unnecessary disturbance of the fascia is avoided by using a hook with not too large a curve, and by not sweeping the hook too widely in search of the tendon, where the tendon is divided strictly at its insertion, and by small snips without a wide separation of the scissor-blades, and where the fascia is only cut to the requisite extent for the perfect division of the tendon. Where these precautions are neglected, the Moorfields' operation loses somewhat its subconjunctival character, and should an unnecessary division of the fascia oculi have been made, retraction of the caruncle will hardly be absent when cicatrization is complete.

The objections that the operation is not so easily performed, and that the complete division of the tendon is not so certainly known as where a free division of the conjunctiva and fascia over the tendon is practised, deserve little consideration; for the greater difficulty, if indeed it exist, is more than outweighed by the superior results of the subconjunctival operation, and because the surgeon may rest assured that the tendon has been thoroughly divided if he can bring his hook up to the edge of the cornea. The thrombus and ecchymosis, which are not very infrequent after this operation, are more real objections, though they may be partly avoided by making a counter-wound over the upper edge of the tendon, under cover of the upper eyelid.

In v. Graefe's operation the eyelids are separated, and the eye is turned outward by an assistant in the same manner as in the Moorfields' method. The surgeon makes a small opening in the conjunctiva, with sharp-pointed scissors, (which are curved on the flat, and have an eccentric hinge) between the insertion of the tendon and the inner edge of the cornea, but rather nearer the latter, and not quite opposite the middle, but nearer the upper or lower edge of the tendon. He then slides the scissor-points beneath the conjunctiva, and snips a small hole in the fascia, through which

he passes a hook (with a slightly swollen end and shorter curve than that used in the Moorfields' operation) under the tendon, which he stretches by pushing it on the convexity of the hook towards the cornea, and cuts at its insertion. The external wound need scarcely be larger than in the Moorfields' method, and when the operation has been well performed it as rarely inflames and suppurates. The button of granulations, which is not infrequently very troublesome after operations where all the tissues have been freely divided, occurred in only one of my 49 cases. I think there is less infiltration than after the Moorfields' method, the directness of the wound allowing the blood to escape readily. In both methods I think that the tendon is cut with equal certainty, and at the same point.

The table (1) of convergent squints shows that little parallelism was completely restored in 55 cases; in 35 of these the Moorfields', in the remaining 20 v. Graefe's method of operating was followed, the success attending the two methods being in the proportion of 7 to 4; but these figures require some explanation and correction. The Moorfields' method was adopted mostly in an earlier series of cases where the results were less rigorously controlled than in the latter series, where v. Graefe's method was almost exclusively employed. I am satisfied that had the results in each series been checked with equal strictness, the proportion of success attending the Moorfields' would not have exceeded that attending v. Graefe's method. Taking this to be an approximation to the truth, the total of completely successful cases would not be above 40 per cent.; but I regard even this as too high a figure, if complete cure is understood to mean the perfect restoration of all the movements, and binocular vision. If, however, the removal of all disfigurement is held to constitute a cure, and this is the popular opinion, the proportion of successful cases is largely swollen by the addition of those cases where an inversion of $1\frac{1}{2}''$ or less remained uncorrected. In 17 of these cases the inversion was constant at all distances; in 15 others it was only present during accommo-

dation for near objects, and the sight lines were parallel when distant objects were regarded. The inclusion of these would raise the total number of cures, as regards personal appearance, to 87 per cent.

In seven cases it was necessary to re-divide tendons after a first operation. In two of these both Recti interni were divided a second time; in one case the original deviation had been $4\frac{1}{2}''$, and in the other $3\frac{1}{2}''$, of which $3\frac{1}{2}''$ and $2''\frac{1}{2}$ remained uncorrected by the first operation, and but for the divergence of the optic axes under chloroform, I should have suspected that I had left part of one or both tendons uncut.

In the five remaining cases where a second operation was practised, one tendon only was re-divided. In one of these (case 32), the first operation had been performed by another surgeon; in the other three the original squint was large = $4''$, $4\frac{1}{2}''$, and $4''$; of which $2''$, $3\frac{1}{4}''$, and $1\frac{1}{2}''$ continued. In all the second operation was successful. In several other cases, where $1''$ to $1\frac{1}{2}''$ inversion continued, either the original squint had been large = $4''$ to $5''$; or after the division of the Rectus, the patients were contented with their improved appearance, or had not enough courage to submit to division of the Rectus of the other eye. The reluctance which patients so often evince to be operated on a second time has been a strong inducement to me to operate on both eyes at once, rather than at two sittings, where the division of both Recti is necessary. I have ever found this a safe proceeding where the squint is = $3''$, but in smaller squints I think the plan of allowing an interval of several days, or even two or three weeks to pass before cutting the Rectus of the other eye, is safer when the division of the first Rectus has proved insufficient.

The causal relation of Hypermetropia and convergent strabismus, discovered by Donders, is strongly confirmed by the figures in the refraction-column, where H.m. appears 43 times, a frequency amply sufficient to show the existence of a very intimate connection between it and this form of squint.

But this figure does not represent its real frequency, for it is a fair inference, from its presence in as many as 26 of the last 28 cases that, had the condition of the refraction been noted in the earlier cases (53 in number), the total frequency would have reached about 90 per cent. From these figures no other conclusions can be drawn that Hypermetropia is the common cause of convergent squint, because it proceeds from an original faulty construction of the eye, and, as such, is the primary anomaly, whilst the squint is a secondary anomaly, which does not appear till long afterwards. Moreover, the disappearance of a commencing convergent squint sometimes follows the correction of the Hypermetropia by suitable convex spectacles.

The following abbreviations occur in the tables:—" for line; R and L for right and left. In the Refraction-column, H.m. for hypermetropia manifesta; M. for Myopia; O. for Operation. In the sight-column the figures express the number of Jaeger's test-types read. Where the acuteness of vision of only one eye is registered, that of the other was normal.

The degree of (absolute) hypermetropia is expressed by a fraction, the denominator of which represents the principal focal length of the strongest convex lens with which distant objects are distinctly seen, when the accommodation has been paralysed with atropia. Manifest hypermetropia is that which is determinable without paralysing the accommodation. Similarly the degree of myopia is shown by a fraction, the denominator of which is the principal negative focal length of the concave lens required to enable the myopic eye to unite the parallel rays incident from distant objects upon its retina.

TABLE I.
CASES OF CONVERGENT SQUINT.

Number of Cases.	Sex.	Age.	Size of Squint.	Sight.	Refraction.	Operation.	Result.	Remarks.
1	F.	12	4'''		..	Both Recti interni divided. Moorfields' op.	Convergence $\frac{1}{2}$ '''.	Parallelism immediately after op.
2	F.	20	3 $\frac{1}{2}$ '''	L. reads No. 10 R. " No. 1	H.	Ditto ditto.	Parallelism.	
3	M.	14	4'''	L. imperfect.	..	Ditto ditto.	Ditto.	Left sight much improved.
4	F.	21	2'''	L. No. 3. Prefers to fix with R.	..	Left Rectus internus divided. Moorfields' op.	Convergence $\frac{1}{3}$ '''.	Immediate effect of op. Parallelism.
5	F.	8	3 $\frac{1}{2}$ '''	L. imperfect.	..	Ditto ditto.	Convergence about 1'''.	L. progressive improvement of sight.
						Right ditto.	Parallelism for distance but $\frac{5}{8}$ ''' convergence when a near object is looked at.	
6	F.	19	..	L. No. 14.	..	Both Recti interni divided. Moorfields' op.	Parallelism.	
7	F.	15	4'''	R. and L. No. 1.	..	Ditto ditto.	Ditto.	During the first few days after op. convergence $\frac{3}{4}$ '''.
8	M.	19	2 $\frac{1}{2}$ '''	L. No. 14.	..	Ditto ditto.	Ditto.	Progressive improvement of vision.

TABLE I (continued).

Number of Cases.	Sex.	Age.	Size of Squint.	Sight.	Refraction.	Operation.	Result.	Remarks.
9	M.	13	3"	R. and L. No. 1.	..	Both Recti interni divided. Moorfields' op.	Convergence $\frac{1}{2}$ ".	Under chloroform, slight divergence after division of the muscles.
10	M.	19	4"	L. imperfect.	..	Ditto	Parallelism.	In raising the upper eyelid with the speculum a piece of straw, $\frac{3}{4}$ of an inch long, was found in the sinus of the conjunctiva where it passes from the lid to the globe.
11	M.	42	2"	..	..	Ditto	Ditto.	The patient did not know of its presence, and suggested that it might have got in nine months before whilst he was cutting chaff for horses.
12	M.	14	3"	R. and L. No. 1.	..	Ditto	Parallelism.	Slight convergence continued sometimes.
13	F.	15	3"	L. imperfect.	..	Ditto	Convergence $\frac{1}{2}$ ".	Capsular cataract.
14	M.	16	3"	L. No. 16.	H. m. $\frac{1}{10}$.	Ditto	Parallelism for distance $\frac{1}{2}$ " convergence for near objects.	L. sight improved. No. 12 read correctly.

15	M.	17	2"	R. No. 16.	..	Ditto	ditto.	Parallelism.	
16	M.	17	2"	L. imperfect	..	Ditto	ditto.	Ditto.	
17	F.	23	2 $\frac{1}{2}$ "	..	..	Ditto	ditto.	Ditto.	
18	F.	23	2 $\frac{1}{2}$ "	..	M. $\frac{1}{8}$.	Ditto	ditto.	Ditto.	
19	M.	15	1 $\frac{1}{2}$ "	R. No. 4. L. 1 $\frac{1}{2}$ "	R. H.m. $\frac{1}{6}$.	Ditto	v. Graefe's op.	Ditto.	
20	M.	8	3"	R. No. 14.	L. H.m. $\frac{1}{40}$.	Ditto	Moorfields' op.	Ditto.	R. progressive improvement of sight, read No. 6.
21	F.	10	3"	L. defective.	..	Ditto	ditto.	Convergence $\frac{1}{2}$ ".	
22	M.	17	5"	L. No. 6.	..	R. Rectus internus re-divided three months afterwards. Moorfields' op.		Parallelism.	
23	M.	17	4"	L. defective.	..	Both Recti interni divided. Moorfields' op.		Ditto.	
24	..	..	3"	L. No. 20.	..	Ditto	ditto.	..	Under chloroform, divergence.
25	F.	10	..	R. No. 8. L. No. 1.	..	Ditto	ditto.	..	Nebulous cornea.
26	F.	5	3 $\frac{1}{2}$ "	..	..	Ditto	ditto.	Ditto.	Divergence under chloroform after division of the muscles. I operated successfully three years before on her elder brother. Her younger brother is beginning to squint.
27	F.	18	4"	L. No. 18 R. No. 1. Fixes habitually with R.	..	Both Recti interni divided. Moorfields' op.		Parallelism.	
28	M.	28	3 $\frac{1}{2}$ "	L. defective. Fixes habitually with R.	..	Ditto	ditto.	Ditto.	

TABLE I (*continued*).

Number of Cases.	Sex.	Age.	Size of Squint.	Sight.	Refraction.	Operation.	Result.	Remarks.
29	F.	6	$4\frac{1}{2}'''$	R. and L. No. 1.	..	Both Recti interni divided. Moorfields' op. Re-division of both Recti interni 3 weeks after the first op.	$3\frac{1}{2}'''$ convergence. Parallelism.	Divergence under chloroform after division.
30	M.	13	$2\frac{1}{2}'''$	R. No. 1. L. No. 20.	L. H.m. $\frac{1}{20}$. R. H.m. $\frac{1}{30}$.	Both Recti interni divided. Moorfields' op. Ditto	Ditto. $2\frac{1}{2}'''$ convergence.	1 year afterwards L. read No. 14. Divergence under chloroform after division.
31	F.	10	$3\frac{1}{2}'''$	R. No. 4.	..	Redivision of both Recti interni. Moorfields' op. Division of L. Rectus internus.	Parallelism. Ditto.	The tendon was attached to the globe behind its normal insertion and also tied to it by several bands. Both Recti interni had been divided 5 years before by another surgeon. Chloroform not used.
32	M.	20	$1\frac{1}{2}'''$	L. No. 14. R. No. 1.	..	Division of both Recti interni. Moorfields' op. Ditto	$1\frac{3}{4}'''$ convergence. Parallelism.	Immediate parallelism.
33	F.	18	$5'''$	R. No. 12. L. No. 1.	..	Division of both Recti interni. Moorfields' op. Ditto	Ditto.	
34	F.	19	$5'''$	R. and L. No. 1.	..	Ditto		
35	F.	12	$4\frac{1}{2}'''$	L. No. 6. R. No. 1.	..	Ditto		

36	M.	21	$3\frac{1}{2}''$	L. No. 1. R. cannot spell No. 20.	..	Ditto	ditto.	$\frac{1}{2}''$ convergence inattentive. Parallelism.	Divergence under chloroform after division.
37	M.	21	$3''$	L. No. 14. R. No. 1.	L. H.m. $\frac{1}{28}$. R. H.m. $\frac{1}{50}$.	Ditto	v. Graefe's op.		
38	M.	20	$5''$	L. No. 20.	..	Ditto	Moorfields' op.	Ditto.	
39	F.	16	$1''$	..	H.m.	Right Rectus internus divided.	Moorfields' op.	Ditto.	
40	M.	22	$5''$	L. No. 6. R. No. 1.	H.m.	Both Recti interni divided.	Moorfields' op.	Convergence $\frac{1}{2}''$.	L. three weeks after op. read No. 2.
41	F.		$2\frac{1}{2}''$	R. No. 6. L. No. 4.	M $\frac{1}{4}$ and amblyopia.	Ditto	ditto.	Parallelism.	
42	M.	26	$2\frac{1}{4}''$	L. No. 2. R. No. 1.	..	Ditto	v. Graefe's op.	Convergence $1''$.	Exuberant granulation. Slow healing.
43	M.	20	$2\frac{1}{2}''$	R. and L. No. 1.	..	Ditto	Moorfields' op.	Convergence $\frac{1}{2}''$.	
44	F.	4	$3''$	..	..	Ditto	v. Graefe's op.	Parallelism.	
45	M.	14	$2\frac{1}{2}''$	R. No. 16. L. No. 2.	..	R. Rectus internus divided.	Moorfields' op.	Convergence $\frac{1}{2}''$.	Immediate parallelism.
46	F.	13	$3\frac{1}{2}''$	L. No. 18. R. No. 1.	L. H.m. $\frac{1}{20}$. R. H.m. $\frac{1}{40}$.	Both Recti interni divided.		Parallelism.	
47	M.	7	$2\frac{1}{2}''$	..	..	Ditto	v. Graefe's op. ditto.	Ditto.	Slight divergence for a few days.
48	F.	9	$3\frac{1}{2}''$	L. No. 14. R. No. 1.	..	Ditto	ditto.	Ditto.	
49	F.	28	$4''$	R. No. 14. L. cannot read No. 20.	..	R. Rectus internus divided.	Moorfields' op.	L. convergence $2''$.	
						L. Rectus internus divided.	v. Graefe's op. at same sitting.		
						L. Rectus internus re-divided 3 weeks afterwards.		Parallelism.	
50	M.	16	$3''$	R. and L. No. 1.	..	Both Recti interni divided.	v. Graefe's op.	Ditto.	

TABLE I (continued).

Number of Cases.	Sex.	Age.	Size of Squint.	Sight.	Refraction.	Operation.	Result.	Remarks.
51	M.	13	3 $\frac{1}{2}$ "	L. No. 20. R. No. 1.	..	Both Recti interni divided. Moorfields' op.	Parallelism.	This patient had been already operated on by another surgeon.
52	M.	6	3 $\frac{1}{2}$ "	R. and L. No. 1.	..	Ditto ditto.	Ditto.	
53	F.	15	4"	L. No. 16. R. No. 1.	H.m.	Ditto ditto.	Convergence $\frac{1}{8}$ ".	
54	F.	17	3"	L. No. 20. R. No. 1.	H. $\frac{1}{12}$.	Ditto ditto.	Ditto $\frac{3}{8}$ ".	
55	M.	10	4 $\frac{1}{2}$ "	R. and L. No. 1.	..	Both Recti interni divided. v. Graefe's op.	Ditto $\frac{3}{4}$ ".	
						L. Rectus internus re-divided seven months after the first op.	Parallelism.	
56	F.	27	3 $\frac{1}{2}$ "	R. No. 16. L. No. 1.	H. $\frac{1}{12}$.	Both Recti interni divided. v. Graefe's op.	Ditto.	
57	F.	13	6"	L. No. 16. R. No. 1.	..	Ditto. Moorfields' op.	Ditto.	In this case the fascia was very freely divided.
58	M.	4 $\frac{1}{2}$	2"	..	..	R. Rectus internus divided v. Graefe's op.	Ditto.	
59	F.	6	3 $\frac{1}{2}$ "	..	..	Both Recti interni divided. v. Graefe's op.	Ditto.	
60	M.	16	2 $\frac{1}{2}$ "	L. No. 20. R. No. 2.	H.m. $\frac{3}{16}$.	Ditto ditto.	Convergence $\frac{1}{2}$ ".	
61	M.	20	3"	L. No. 16. R. No. 1.	H. $\frac{1}{9}$.	Ditto ditto.	Ditto $\frac{1}{2}$ ".	Seven days after L. read No. 8.
62	F.	12	4"	L. No. 20. R. No. 1.	..	Ditto Moorfields' op.	Parallelism.	

63	F.	3	21'''	..	..	Ditto	v. Graefe's op.	Ditto.	Convergence 1'''.	
64	M.	5	4'''	..	..	Ditto	Moorfields' op.	Convergence 1'''.		
65	F.	6	4'''	..	..	Ditto	v. Graefe's op.	Parallelism.		
66	F.	9	3'''	R. and L. No. 1.	..	Ditto	ditto.	Convergence $\frac{1}{2}$ '''.		
67	F.	17	4'''	R. and L. No. 1.	..	Ditto	ditto.	Ditto		
68	M.	7	5'''	R. and L. No. 1.	L. H.m. $\frac{1}{12}$.	Ditto	ditto.	Ditto	11'''.	
69	M.	10	..	R. and L. No. 8.	H.m. $\frac{1}{10}$.	Right Rectus internus di-		Ditto	1.	
70	F.	19	4 $\frac{1}{2}$ '''	R. and L. No. 2.	H.m. $\frac{1}{36}$.	Right Rectus internus di-		Ditto		
71	F.	13	3'''	L. No. 19. R. No. 1.	R. H.m. $\frac{1}{12}$.	vided. 1 week after L.		Ditto	$\frac{3}{4}$ '''.	
72	F.	9	4'''		L.M. $\frac{1}{25}$.	v. Graefe's op.	Both Recti interni divided.	Parallelism.		Immediate convergence $\frac{3}{4}$ '''.
73	F.	18	3'''	R. No. 2. L. No. 1.	H.m. $\frac{1}{10}$.	v. Graefe's op.	ditto.	Ditto.		
74	F.	12	4'''	R. No. 10. L. No. 1.	H.m. $\frac{1}{10}$.	ditto.	ditto.	Inversion $\frac{1}{2}$ '''.		
75	F.	17	3'''	R. No. 8. L. No. 6.	L.H. $\frac{1}{6}$.	Right Rectus internus di-		Parallelism for distance.		
76	M.	13	3'''	R. No. 8. L. No. 1.	H.m. $\frac{1}{24}$.	vided. Moorfields' op.		Inversion $\frac{1}{2}$ ''' for near objects.		
77	F.	9	1 $\frac{1}{2}$ '''	R. and L. No. 1.	H.m. $\frac{1}{50}$.	Ditto	v. Graefe's op.	Inversion $\frac{1}{2}$ '''.		Coruncle unusually re- tracted.
78	F.	17	4'''	R. defective.	H. $\frac{1}{6}$.	L. Rectus internus divided.		Ditto	$\frac{1}{2}$ '''.	
					H.m.	Both Recti interni divided.	Moorfields' op.	Ditto	1 $\frac{1}{2}$ '''.	Under chloroform, im- mediate divergence after division.
79	M	10	2 $\frac{3}{4}$ '''	R. and L. No. 1.	H.m. $\frac{1}{24}$.	R. Rectus internus re-di- vided, six weeks af- wards.		Parallelism for distance.		
						Both Recti interni divided.		Slight inversion for near objects.		
						v. Graefe's op.		Inversion 1 $\frac{1}{2}$ '''.		

TABLE I (continued).

Number of Cases.	Sex.	Age	Size of Squint.	Sight.	Refraction.	Operation.	Result.	Remarks.
80	F.	7	4½"	R. and L. No. 1.	R. H.m. ½ L. H.m. ¼.	Right Rectus internus divided, 16 days after L. divided. v. Graefe's op.	R. inversion 3" when L. fixes. L. inversion 4" when R. fixes.	
81	F.	21	3"	R. No. 1. L. + 10" lens. No. 18.	R. H.m. 1½ L. H.m. 1½ R. M. ½ L. M. ¾.	L. Rectus internus divided. v. Graefe's op.	Parallelism for distance, but on covering R. L. inverted 1".	Corneal speck. L. out-lines of optic disc confused.
82	M.	17	3½"	R. and L. No. 1.	L. H.m. 1½ R. M. ½ L. M. ¾.	L. Rectus internus divided. v. Graefe's op.	R. inverted 1½" when L. fixes.	
83	F.	20	3"	R. No. 1. L. No. 20.	..	L. Rectus internus divided. v. Graefe's op.	Parallelism, but when one is covered the other is inverted ⅓".	
84	M.	9	3"	R. and L. No. 1.	H.m.	Both Recti interni divided. v. Graefe's op.		Posterior staphyloma.
85	M.	7	1"	L. No. 1. R. No. 18.	M. ⅓.			
86	F.	14	3"	R. No. 4. L. No. 1.	R. H.m. 1¼ L. H.m. ½ H.m. ⅓.	Right Rectus internus divided. v. Graefe's op.	Parallelism.	Four months before another surgeon had divided it.
87	M.	23	¾"	R. No. 1. L. No. 20.	H.m. ⅓.	L. Rectus internus divided. v. Graefe's op.	Parallelism.	Squinted from early childhood.
88	M.	21	3"	R. No. 20. L. No. 1.	R. H.m. ½ L. H.m. 1¼.	Both Recti interni divided. v. Graefe's op.	Parallelism for distance. Eversion 1" for near objects.	

89	M.	27	$1\frac{1}{2}'''$	R. No. 1. L. No. 20.	R. H.m. $\frac{1}{8}$. L. H.m. $\frac{1}{12}$.	L. Rectus internus divided. v. Graefe's op.	Parallelism for distance, but after sustained vision of near objects $1\frac{1}{2}'''$ inversion. Parallelism.	Squint attributed to a fall in infancy.
90	M.	6	$4'''$	R. No. 1. L. No. 16.	H.m.	Both Recti interni divided. v. Graefe's op.	Parallelism.	
91	F.	8	$4'''$	R. and L. No. 1.	H.m. $\frac{1}{12}$.	Ditto.	Inversion $1'''$.	
92	F.	..	$1\frac{1}{2}'''$	R. No. 8. L. No. 1.	H.m. $\frac{1}{16}$.	R. Rectus internus divided. v. Graefe's op.	Parallelism.	
93	M.	14	$2\frac{1}{2}'''$	R. No. 2. L. No. 1.	H.m. $\frac{1}{36}$.	Ditto.	Inversion $\frac{1}{3}'''$.	Squint began in his 1st year.
94	M.	14	$4'''$	R. No. 1. L. No. 16.	R. H.m. $\frac{1}{40}$. L. H.m.	Both Recti interni divided. v. Graefe's op.	Ditto $1'''$.	Squint began in his 4th year.
95	M.	8	$2\frac{1}{4}'''$	R. No. 16. L. No. 1.	R. H.m. $\frac{1}{12}$. L. H.m. $\frac{1}{16}$.	R. Rectus internus divided. v. Graefe's op.	Ditto $\frac{1}{2}'''$.	Ditto.
96	M.	10	$1\frac{1}{2}'''$	R. No. 1. L. No. 20.	R. H.m. $\frac{1}{8}$. L. H.m. $\frac{1}{16}$.	L. Rectus internus divided. v. Graefe's op.	Parallelism, but after sustained vision of near objects $\frac{1}{3}'''$ in- version.	
97	F.	11	$1\frac{1}{2}'''$	R. and L. No. 1. Habitually fixes with R.	R. H.m. $\frac{1}{36}$. L. H.m. $\frac{1}{40}$.	L. Rectus internus divided. v. Graefe's op.	Parallelism.	Began to squint in 5th year.
98	F.	14	$4'''$	R. No. 6. L. No. 1.	R. H.m. $\frac{1}{12}$. L. H.m. $\frac{1}{16}$.	Both Recti interni divided. v. Graefe's op.	Ditto.	Began to squint in 4th year.
99	M.	10	$1\frac{3}{4}'''$	R. No. 1. L. No. 20.	H.m.	L. Rectus internus divided. v. Graefe's op.	Ditto.	

In the first five cases in the second table the squint had always been divergent. In two of them it was associated with Myopia, which stands in the same causal relation to divergent as Hypermetropia does to convergent squint. In two cases where the divergence did not exceed 2" the external Rectus muscle was divided subconjunctivally; in the other three the conjunctiva was divided to an extent commensurate with the breadth of the tendon, and both eyes were operated on. The subconjunctival operation is most suitable to small divergent squints, because larger squints require for their correction a more free division of the conjunctiva and fascia, and this is not attended with the same disadvantages as when the Recti interni are divided.

The two last had originally been convergent squints, and divergence had followed division of the Rectus internus; in one case it probably proceeded from the severance of the tendon at a considerable distance from its insertion, and in both cases, no doubt, the conjunctiva and fascia over the Recti interni had been divided to an unnecessary extent.

Here Critchett's operation afforded me very satisfactory results. In this operation the conjunctiva is divided near the inner border of the cornea, and dissected in a flap, together with the fascia off the inner side of the globe. This liberates the tendon of the Rectus internus from its acquired faulty place of insertion. The Rectus externus is next divided, in order to allow a sufficient inversion of the cornea. Lastly, the wound at the inner side of the eye is closed with fine silk stitches, after removing so much of the free edge of the conjunctival flap, that the closure of the wound draws the sunken caruncle forward, and gives the cornea a slight convergence. The tendon of the Rectus internus which has been brought forward with the fascia and conjunctiva, unites itself to the globe at an anterior point, nearer the situation of its normal insertion. The fine stitches give little trouble; they fall out in a few days, or they may be removed at the end of a week. Slight convergence is always desirable at first,

TABLE II.
CASES OF DIVERGENT SQUINT.

Number of Cases.	Sex.	Age.	Size of Squint.	Sight.	Refraction.	Operation.	Result.	Remarks.
1	M.	12	1'''	R. and L. No. 18.	M. $\frac{1}{16}$.	R. Rectus externus divided. Moorfields' op.	Parallelism.	Squint dated from childhood, and did not depend on M.
2	M.	30	2½'''	L. No. 4.		Both Recti externi divided. Conjunctiva freely cut.	Ditto.	
3	F.	14	2'''	R. No. 2.	L.m. $\frac{1}{16}$. R.m. $\frac{1}{6}$.	R. Rectus externus divided. Moorfields' op.	Ditto, but ultimately slight divergence.	
4	F.	16	2'''	L. No. 20.		L. Rectus externus divided. 16 days afterwards R. rectus externus divided.	Divergence 1'''.	
5	M.	25	3'''			Both Recti externi divided. Free wound of conjunctiva.	Parallelism. Divergence 1½'''.	The divergence followed division of the Rectus internus several years before, for convergent squint. The tendon had not been divided close to the sclerotic. The shrunken stump was conspicuous. The caruncle was much sunken. This patient's appearance was so much improved that I did not recognize her when she came again under my care for another affection a year afterwards.
6	F.	22	2½'''		H.	Division of Rectus externus re-division of Rectus internus and advancement of the faultily attached tendon. Right eye.	Parallelism for distance. Divergence $\frac{3}{8}$ ''' when accommodated for 6 inches distance.	
7	F.	36	3½'''	R. No. 16. L. No. 2.	H. $\frac{1}{2}$.	Ditto, in left eye.	Ultimately about 1''' divergence.	

The divergence followed division of the Rectus internus by Mr. Liston for convergent squint. The cornea could scarcely be brought to a central position. After advancement of the Rectus internus it could be inverted nearly to the inner canthus.

because the cicatrix at the inner side of the eye always yields to some extent, and if at the time of the operation the vertical meridian of the cornea has only been brought to the middle of the lid, the final correction of the divergence will be imperfect.

A CASE OF CHRONIC MUCOCELE OF THE ETHMOIDAL CELLS
INVADING THE LEFT ORBIT, AND ACUTE ABSCESS OF THE
RIGHT FRONTAL SINUS.

By J. W. HULKE.

In continuation of the cases of Abscess and Distension of the Frontal Sinus, with Inspissated Mucus, published p. 147 and 341, vol. iii., I record the following case, recently under my care. In some respects it is the most interesting of the series.

Thomas W., æt. 22, a farm servant, admitted into the Middlesex Hospital, June 12th, 1863, with orbital tumours, was kindly placed under my care by my colleague, Mr. Shaw.

The left eyeball was displaced considerably forwards and outwards by an oblong, elastic, fluctuating tumour, which protruded between the eyeball and the upper and inner border of the orbit, and was grooved in the last situation by the *tendo oculi*. The upper part of the tumour seemed to be connected with the corresponding internal angular process of the frontal bone, which was slightly enlarged. The lower end of the tumour could be felt passing backwards along the inner side of the orbit, but its posterior limits could not be reached.

The right eyeball was also displaced, but in a less degree, in a forward and outward direction by a solid tumour lying at the upper and inner border of the orbit. The upper eyelid was red, and slightly oedematous. At the centre of its attached border, just below the eyebrow, there was a small depressed orifice, the external opening of a fistula, through which a probe could be passed upwards and inwards into the right frontal sinus, and from this so far towards the left, that the septum of the sinuses must either have been deficient, or very much displaced towards this side. From this fistula a thin mucus oozed, most abundantly during the night when he estimated the quantity at half a tea-cup. The right internal angular process of the frontal bone was enlarged, and studded with warty, bony out-growths. The centre and right half of the forehead were swollen and fluctuated. The swelling reached two inches above the root of the nose, and outwards to the right temporal ridge. The limits of the swelling were marked by a well-defined raised edge, like the brink of a crater. There was no redness nor increased heat

of the skin, nor appearance as of an abscess pointing. Pressure on this frontal swelling was not communicated to the orbital swelling, and did not produce any discharge of pus from the fistula in the upper eyelid.

He said, that two years before, whilst in good health, a "small lump" appeared at the inner side of the left orbit, which slowly grew and pushed the eyeball from its place. It was unaccompanied by pain or head symptoms, but caused, at first, a troublesome diplopia, which disappeared when the eyeball had become much displaced.

In April he was seized with violent pain about the right orbit. The eyelids became very red and swollen. The swelling spread to the forehead and across to the left eyelids. He had severe headache and much fever. After four incisions had been made in the right eyebrow, each giving vent to matter, the swelling quickly subsided, and the pain more slowly diminished.

This history with the local symptoms pointed unmistakably to acute abscess of the right frontal sinus; whilst the expansion of the corresponding internal angular process of the frontal bone, and the displacement of the eyeball by the encroachment of the posterior wall of the sinus on the orbit, made it probable that the abscess was secondary to chronic distension of the sinus with mucus retained in consequence of some hindrance to its escape through the infundibulum into the nasal fossæ. The fluctuating frontal swelling was probably an abscess under the periosteum produced by extension of the inflammation through the anterior wall of the sinus. The absence of any free communication between this abscess and the sinus was inferred from the non-communication of fluctuation, and the fact that perforation of the anterior wall had not been observed in any of the cases of abscess of the frontal sinus already published in this journal.

But the nature of the tumour in the left orbit was not so clear. An able surgeon had supposed it to be cancer. This was improbable from the consideration that encephaloid only of the various forms of cancer has an elasticity which can be readily mistaken for fluctuation, and had the tumour been an encephaloid cancer, a much more rapid growth might have been expected in so young and vigorous a person. Besides it was improbable that the primary cancer would have existed for two years without the occurrence of secondary tumours in the next lymphatic glands. (None of the lad's relations had had cancer.) From my experience of former cases, I was inclined to regard the left tumour as a chronic mucocele of the left frontal sinus, and decided to lay it open, and at the same time expose the interior of the right sinus.

June 17.—Chloroform having been given, I slit up the fistula leading into the right frontal sinus, and clipped away the

anterior wall of the sinus until its interior was laid bare. It was nearly filled with a soft, florid, highly vascular granulation-tissue, which bled very freely. No bare bone was detected at any part of this cavity, but on opening the superficial abscess in the forehead, the outer surface of the bone, forming the anterior wall of the sinus, was extensively stripped of its periosteum. A puncture was next made in the tumour in the left orbit. Sharp arterial bleeding followed, but as this seemed to proceed only from the dilated angular artery, the puncture was enlarged till the finger could be pushed into a cavity from which about 3i of viscid, glairy mucus was removed. This cavity was lined by a smooth vascular membrane. It ran along the inner side of the orbit, encroaching greatly on the nasal fossæ, and appeared to have originated in the ethmoidal cells and those of the frontal bone, which communicate with them. Neither with a probe, nor by injecting water could I find any communication with the dilated right frontal sinus, and the cavity did not take the direction of the left sinus.

Caoutchouc bags of ice were found very useful in moderating the sharp inflammation which ensued. The cavities were syringed with tepid water, to which a small quantity of Condyl's solution of permanganate of potash was added. For about a fortnight a large quantity of viscid muco-pus was discharged, estimated at about 3iv. daily. Drainage tubes were worn to facilitate its escape, and prevent the openings closing too narrowly. The discharge very slowly decreased. No sequestrum was thrown off from the outer surface of the anterior wall of the right frontal sinus, but the periosteum became united to the bone. The eyeballs slowly returned towards their normal positions, and the distortion of his features, produced by their unnatural separation, so striking on his admission into Hospital, diminished so much, that it was no longer conspicuous when he returned home.

November 17th.—At this time the displacement of both eyes, particularly that of the left eye, had almost wholly disappeared. A small tucked scar beneath the centre of the right eyebrow marked the opening of the minute fistula leading to the right frontal sinus. A probe could only be passed half an inch into the cavity in the left orbit, and the discharge from this had diminished to a few drops daily. He was ordered to wear a small drainage-tube, as long as the discharge continued, in this cavity, shortening it from time to time as the cavity became less deep.

TRAUMATIC CATARACT PRODUCED WITHOUT RUPTURE OF THE EXTERNAL COATS OF THE EYE.

BY GEORGE LAWSON, F.R.C.S.,

*Assistant-Surgeon to the Royal London Ophthalmic Hospital,
Moorfields, and the Middlesex Hospital.*

WITHOUT any rupture of the external coats of the eye, the lens, or the capsule enclosing the lens, may be so injured that cataract may speedily follow, and so shortly indeed after the accident that the relation between cause and effect cannot be doubted. The lens made up of transparent fibres, arranged in an exceedingly delicate and complex manner, is enclosed in a thin and brittle capsule, lined with a single layer of nucleated cells. It is extra-vascular, and probably dependent for its supply of nourishment on the integrity of its capsule and the layer of cells which coat its interior, and for the even distribution of this supply to each part of its structure, it is essential that the exact relationship between its component fibres should be maintained. The lens thus deriving its support from a slender source, is liable to be easily influenced by external causes. A sudden jar or concussion, without rupturing the capsule may disarrange its internal structure, and either from directly interfering with its nutrition, or from producing some molecular change in the particles of which it is composed, its transparency becomes impaired, and cataract results.

Again, sudden violence applied to the parts about the head, or to the eye itself, may, by the propagation of its force, cause, without any rupture of the external coats of the eye, a rent in the capsule of the lens, sufficient to allow the aqueous to permeate its interior, and to render its transparency opaque. The form of cataract which is usually observed when thus produced, is a diffused opacity. A portion of the lens first becomes nebulous, and this nebulosity increases until the whole lens is opaque.

CASE I.—*Cataract from a Blow with a Whip, without Rupture of the external Coats of the Eye, but causing Laceration of the Capsule of the Lens.*

A coachman came under my care at the Hospital in February, 1862, in consequence of rapidly failing sight of the right eye. Three weeks previously he had received a blow with a whip. It produced some uneasiness at the time, but that was all. He is positive that up to that date he could see well; since then the sight in that eye has become impaired, and is daily getting worse.

Examined with the ophthalmoscope. The central portion of the lens is nebulous, and a small piece of the central part of the capsule is opaque, showing that a rent had taken place.

CASE II.—*Traumatic Cataract coming on immediately after a Blow on the Eye, without visible Rupture of the Lens Capsule, or of any of the external Coats of the Eye.*

December, 1863.—C. W., æt. 10. One week ago whilst walking into the school-ground where the game of tip-catt was being played, a boy struck the catt and it flew with violence against his right eye. An hour or so afterwards, he discovered that the sight was dim. The dimness increasing, caused his father to bring him to the Hospital.

Present State.—The pupil is unevenly dilated, being more dilated at the outer than the inner side. The part of the eye struck by the catt was the outer, and here the iris is most completely paralysed. The whole globe is considerably injected, but he is perfectly free from all pain. He can just count fingers. The lens is cataractous—a diffuse nebulosity. Examined with the ophthalmoscope, the lens is too cloudy to allow the fundus to be seen. No rent in the capsule of the lens could be detected.

CASE III.—*Cataract from a Blow, with Rupture of the Capsule of the Lens, but without Injury to the external Coats of the Eye.*

In January of this year, B. C., æt. 21, from Woolwich, applied to the Hospital for advice concerning his left eye. A large piece of opaque capsule occupied the pupillary area. All lenticular matter had been absorbed.

His story was, that three years previously, whilst chopping wood, a fragment flew up and struck his eye with considerable force. The external coats of the eye were uninjured, but a fortnight afterwards he found that he was nearly blind with that eye. He continued in this state for some time, when he again began to see, but he never recovered his proper sight.

In this patient, the capsule of the lens had no doubt been lacerated, and the free admission of the aqueous had produced a gradual solution and absorption of the lenticular matter, and left only the opaque capsule now occupying the pupillary space.

CASE IV.—*Cataract from a Blow producing Laceration of the Capsule of the Lens, without Rupture of the external Coats of the Eye.*

C. C., æt. 13, a shoemaker, from Northampton, applied to the Hospital, December, 1862. He stated that six weeks ago whilst closing a pair of shoes his hand slipped, and the knuckle of the right hand struck his left eye. He suffered comparatively little pain at the time and has had none since, but he noticed that the sight of that eye soon became very misty, and in two or three days afterwards he was unable to distinguish even large objects with it.

Present Condition.—The eye is quite quiet ; its tension normal. The lens is cataractous, and through the rent in the capsule a large portion of lenticular matter has escaped, and is floating in the anterior chamber.

CASE V.—The following case occurred in the practice of my friend, Dr. Buzzard, and is a good example of how a cataract may be produced *without* any direct blow on the eye itself, but simply by a propagation of the force from the part struck to the eye, causing a disarrangement of the lenticular matter, without even rupturing the lens capsule.

J. C., æt. 23, a healthy young man, was in the train on the North London Railway, which met with a collision near the Kentish Town Station on the evening of September 2nd, 1861, when an engine, tender, and several carriages ran into a ballast train, and rolled down the steep embankment. He was with his wife and infant in a second-class carriage next to the tender of the engine.

When removed from the *débris* he was bleeding from several wounds on the head, especially from those about the left temple, the brow, and the outer angle of the orbit. The eye itself was in no way injured externally. He was taken to University College Hospital, where he remained for a week. I first saw him, says Dr. Buzzard, on September 27th, 1861. The wounds were then nearly all healed, and but faint scars indicated their site. He complained of feeling much shaken, and looked ill. Until the accident his sight in both eyes was perfect ; of this fact he was quite positive. Since the occurrence, he has found the sight of the left eye becoming hazy and confused.

Examined with the ophthalmoscope ; the following was the condition :—The pupil large, sluggish, of an oval shape, being

produced downwards and outwards; the sector of the lens corresponding to this pupillary lesion, opaque. The opacity affects the superficial fibres only, and has a shining satin-like appearance. The rest of the lens is transparent; no tear in the capsule was observed. He spells words of No. 16 with pain, slowly.

CASE VI.—Mr. Haynes Walton has given me the following notes of a patient who was under his care:—

Cataract following a Blow on the Eye from a Spent Shot.

A marker at a shooting-ground was more than eighty yards distant from the man who shot at the pigeon. A No. 6 shot struck the outside of the sclerotic of one of his eyes, and caused no further inconvenience than a very slight circumscribed redness. No pain was felt, only a slight tap. In a few weeks the lens became quite opaque.

CASE VII.—Mr. Hulke relates the following as having come under his care at the Hospital:—

A boy applied to the Hospital suffering from a large swollen milky cataract in the right eye. The pupil active, and with good perception of light. It followed a few days after a sharp blow with an arrow (such as are used in archery) on the *left* side of the root of the nose.

CASE VIII.—*Traumatic Cataract produced by a Blow on the Eye which did not penetrate.*

A telegraph clerk was struck in the right eye by a piece of orange-peel shot with an india-rubber spring. Three weeks afterwards he came to the Royal London Ophthalmic Hospital, in consequence of the sight failing. At this time the pupil was large and motionless. There was no pain nor redness. There was a puckered rent in the capsule at the anterior pole of the lens, with milky opacity of the lens tissue at this spot. The obscuration of vision corresponded to the degree and extent of this opacity.

INOCULATION AND SYNDECTOMY.

By GEORGE LAWSON, F.R.C.S.,

Assistant-Surgeon to the Royal London Ophthalmic and Middlesex Hospitals.

THE number of cases of severe granulation of the lids, accompanied with vascular corneæ, which have been treated

by the inoculation of purulent matter at the Hospital, a short account of which, by Dr. Bader, appeared in the last number of the Ophthalmic Hospital Reports, prove indubitably the success of this line of treatment. It is, however, necessary that the disease should be sufficiently advanced before such a mode of dealing with it can with safety be resorted to. The greatest success has resulted in those cases, where the lids were not only severely granular, but where the whole cornea was completely vascular, semi-opaque, thickened, and the pupil scarcely visible; where, in fact, there was little if anything to lose, and all to gain. Such eyes will bear strong purulent matter, as the yellow pus from an infant with purulent ophthalmia, whose mother may have suffered from gonorrhœa, and after a rather long course of suppuration, will almost invariably recover, and good useful sight will be regained.

In the treatment of granulations by inoculation, much discrimination is required in the selection of the cases, and in the quality of the pus which should be used.

It is best that the pus should be always in the first instance taken from the eye of an infant suffering from purulent ophthalmia, as it seems to me, that although gonorrhœal matter may in extreme cases answer very well, yet there is always a certain amount of risk as to its purity, whether some syphilitic virus may not accompany it, for since a chancre in the urethra is occasionally associated with gonorrhœa, it is difficult, if not impossible to say, that the patient from whom the matter is derived, is free from it. I prefer for this reason always to take it from the child.

The strength of the pus with which you wish to inoculate may be judged of: 1st, by the colour, and 2nd, by the severity and duration of the inflammation which it has excited in the eye from which it is taken. The yellow pus is always more active than the whitish discharge so commonly seen. Again, the period of the disease at which the pus is taken influences materially the amount of inflammation and suppuration it is capable of setting up. Pus from the eye of

an infant in the early and most acute stage of purulent ophthalmia, will produce much more serious effects than that taken from the same eye at a later period of the disease, after it has undergone some treatment, and is on the decline.

Another point of practical importance is settled by the experience of the hospital.

Pus fresh from the eye of an infant gives rise to a more moderate suppuration with less oedema of the lids than when taken from an eye which is suffering from inoculation. The strength or virulence of the pus seems to increase in its travel through one or two eyes, so that if A is inoculated with mild purulent matter, the pus from A's eye will produce more intense ophthalmia in the eye of B than the original pus which inoculated A.

The most certain and effectual cure of severe and otherwise intractable granular lids undoubtedly is inoculation.

Many other remedies give great but temporary relief, and many cases, in course of time get, to a certain extent, well; but the only remedial agent which will for a certainty destroy the granulations and leave the lining membrane of the lids smooth within a definite period of time, is inoculation.

Now, from experience we know that in the very severe forms of granulation, where the cornea has become a pannus and but little more than perception of light remains, this line of treatment is specially applicable, and that the results are most satisfactory, but in the large majority of patients who apply for hospital relief, the disease is not so advanced; and it is a question of serious moment whether it is not possible so to prepare the eye by previous treatment, that the milder cases may with safety be fitted for inoculation. This, I think, has been partially accomplished, and the cases I have now to record show that if a large portion of conjunctiva has been removed from around the cornea (syndectomy), and the eye allowed thoroughly to recover, that the operation of pus in such an eye is considerably limited. This no doubt is owing to the purulent inflamma-

tion being principally confined to the conjunctiva lining the lids, for by the operation of syndectomy, one eighth of an inch of conjunctiva and sub-conjunctival tissue has been removed from around the cornea, so that not only is there a great diminution in the quantity of the mucous membrane on the globe which can become inflamed, but the sub-mucous tissue has also been destroyed, and a firm broad cicatrix spreads round the cornea, and serves as a barrier to arrest the extension of the suppurative action to it from the conjunctiva.

CASE I.—*Granular lids, with the upper half of the Cornea vascular, treated twelve months ago, by Syndectomy, but without benefit—Inoculation—satisfactory Result.*

E. R., æt. 24, has suffered from granulations of the right lid for the last four years. Twelve months ago, on account of vascularity of the upper part of the cornea, the operation of syndectomy was performed, and a broad band of conjunctiva, with the sub-conjunctival tissue, removed. She made a good recovery, and for a few weeks after it appeared as if she was going to derive benefit from the operation; the vascularity of the cornea certainly diminished, but the granular state of the lid remained unchanged. She continued occasionally to attend the Hospital as an out-patient, and used a mild astringent lotion. The vascularity of the cornea, in four or five months after the operation, was as great as before, and there was considerable photophobia. Steadily the eye became worse, and on September 17, 1863, she was again admitted into the Hospital.

Her condition was then as follows:—The right lid, granular. The upper two-thirds of the cornea rough and vascular, but the lower one-third almost clear.

Sight.—Able to count fingers, but not to read any type. There is great photophobia and lachrymation.

September 29th.—The eye was inoculated with mild pus from the eye of an infant who had been under treatment for purulent ophthalmia.

30th.—Twenty-four hours after the inoculation the eye began to water and the lid to swell.

October 1st.—Eyelid much swollen; free purulent discharge. Has had a great deal of pain in the eye during the night.

4th.—Profuse discharge from between the lids; complains of a good deal of pain.

The purulent ophthalmia thus started, was allowed to proceed uninterrupted, no local astringents were applied to arrest

the discharge. The patient was only allowed to wipe the eye with a piece of linen dipped in tepid water, and keep the eye clean.

On October 20th.—The purulent discharge had sufficiently abated to allow her to leave the Hospital, and attend as an out-patient. She had great photophobia, but very little pain. The cornea is entire.

After leaving the Hospital, the discharge gradually ceased, and the sight steadily improved.

January 29th, 1864.—The patient to-day came to the Hospital, and the following is her state:—

No vascularity of the cornea. It presents a general smooth surface, but is very slightly clouded. The lid is still granular, but very little when compared to its condition previous to inoculation.

She is able to read No. 12 of Jaeger's Test Types.

The eye will continue to improve, and probably the remaining granulations will diminish until they ultimately disappear. The cause of their not having been entirely destroyed is probably that the pus was not quite strong enough, and the period of supuration rather too short.

CASE II.—Granulations of right Eyelid, Cornea Vascular, but with clear Interspaces—Syndectomy, followed two months afterwards by Inoculation—satisfactory Result.

S. W., æt. 24, had been under treatment from time to time for eight years, on account of a granular condition of the eyelids, accompanied with entropion. For the relief of the entropion, the eyelashes had at last been excised, but the granulations of the right eyelid resisted all treatment, and the cornea had become rough, uneven in its curvature, and vascular, but with tolerably clear interspaces between the larger vessels.

In November, 1862, she was admitted into the Hospital, and as the eye did not seem a favourable one for inoculation, Mr. Bowman performed syndectomy, removing a broad band of conjunctiva from around the cornea, and all the subjacent cellular tissue. At this time she was able to count fingers and see large objects, although she could not read any type.

After the first effects of the operation had passed away and the wound had healed, she certainly saw better, and could make out letters of No. 20. But this improvement was of very short duration, for the eye soon became very irritable, and the cornea more dull, and after a lapse of between three and four months, her sight was decidedly worse than before the operation.

She continued much in the same state until August, 1863, the amount of irritability of the eye would vary, at one time better, at another worse, but the vision remained unaltered.

She could see an object moving in front of her right eye, but she could not with any certainty even count fingers at three or four inches distance.

August 21, 1863.—Was readmitted for the purpose of inoculation. The eye was inoculated on a Friday, at 12 o'clock, with strong pus from a patient in the house undergoing inoculation.

At 11.30 on the following day the lid began to swell. Great œdema followed, but the purulent discharge was not at all excessive. After eight days, the swelling of the lid and the purulent discharge began to diminish, and at the end of the fourth week she was made an out-patient. At the time she left the Hospital, there was still a good deal of discharge from between the lids. No treatment was adopted to arrest the purulent ophthalmia, it was allowed to run its course, but the patient, after the second or third day, was permitted to wipe away, with a piece of linen dipped in tepid water, the discharge from the lids, and so keep them clean.

February 11th, 1864.—I saw the patient this morning. The membrane lining the lid of the inoculated eye is perfectly smooth, and the sight has so much improved that she is able to read No. 12. The cornea is slightly nebulous, but no longer vascular.

From long-continued irritation, its curvature is manifestly altered, and hence the benefit which her sight should derive from having regained so much of the transparency of the cornea is greatly curtailed.

CASE III.—*Granulations of both Eyelids with Vascular Cornea—the Left Eye treated by Inoculation—the Right Eye first by Syndectomy, and then by Inoculation—good Result.*

The following case is specially interesting, as both eyes were almost in a similar condition when she first applied to the Hospital, and two different modes of treatment were adopted. The right eye was inoculated, and the result was most satisfactory.

On the left eye, after an interval, syndectomy was performed, but with only temporary relief. The granulations continued as before, the cornea became a perfect pannus, and inoculation was then resorted to. Strong pus was used, but the activity of the purulent ophthalmia was much less than in the right eye, sufficient however to destroy the granulations, and to restore to the patient a useful eye.

Ellen R., æt. 21, was admitted into the Hospital in July, 1862, in the following condition:—

The lids of both eyes very granular, the granulations large and fleshy. Both corneæ completely vascular. No photophobia. She could guide herself about, but was unable to discern features

or read any type. She could merely distinguish an object in front of her.

The left eye was inoculated on 5th July, 1862, with pus from a child with purulent ophthalmia.

Severe inflammatory action followed with great oedema of the lids and purulent discharge. It was allowed to run its course unchecked, and when the activity of the inflammation had subsided, she was made an out-patient.

In October of the same year, the report states that the eye is perfectly quiet, the conjunctiva of the lids smooth, and she is able to read words of No. 6 Jaeger.

On October 10th, 1862, she was re-admitted for the treatment of the right eye.

Since the left eye had been inoculated, this eye had continued to get worse, and she had now little more than mere perception of light.

Syndectomy was performed, and one-eighth of an inch of conjunctiva and sub-conjunctival tissue removed from around the cornea, and close up its margin.

Free suppurative action followed this operation, and a semi-purulent discharge continued for many weeks after she left the Hospital.

On December 4th, the report states that the discharge still continues. The sight is decidedly improved, and she is just able to count fingers.

So far the progress of this case was reported in the last number of "The Ophthalmic Hospital Reports," page 64. For about two months afterwards the eye slightly but slowly improved. The discharge entirely ceased, and for a time she ceased her attendance at the Hospital.

In July, 1863, she again became a patient. The eye had relapsed into its former state; the granulations were large and abundant, and the cornea a perfect pannus. She was unable with that eye to read any type or to distinguish any object.

On August 8th, she was re-admitted as an in-patient, and the eye inoculated with strong purulent matter from the eye of a man then undergoing the same treatment.

Twenty-four hours afterwards, free purulent ophthalmia was established. The discharge was much less in quantity than from the other eye when inoculated, but the lid was much swollen.

On the 29th, she left the Hospital. The lids were then in their normal state, the eye free from all pain. A moderate discharge still continuing, and able to read words of No. 20.

She has steadily improved, and, February 15th, 1863, the report is, she can read No. 12, the cornea is cloudy, but no vessels to be seen on its surface. The lining membrane of the lid smooth, and the eye quite free from irritation. This eye will continue to improve.

She is able to do needle-work, and with the left eye to read a book, with No. 6, or Bourgeois type.

CASE IV.—*Granular Lid of the Right Eye treated with Syndectomy, and afterwards by Inoculation.*

J. M., æt. 28, admitted into the Hospital under Mr. Bowman, November 24, 1863. He was an old soldier, and went through the Crimean campaign. His eyes were first inflamed when in the Crimea, and since then they have never been well. The left eye has partially recovered, but in the *right* the conjunctiva of the lid is granular, the cornea opaque and vascular, the ocular conjunctiva congested, and he has great photophobia. He has perception of light, but he cannot count fingers.

November 24.—Mr. Bowman performed syndectomy, and removed a portion of conjunctiva from around the cornea, with all the corresponding subjacent cellular tissue.

25th.—Has had but little pain, and slept well.

27th.—Complains of pain over the brow. There is no discharge.

December 1st.—The wound having healed, the eye to-day was inoculated with pus from the eye of a child four weeks old, suffering from purulent ophthalmia with thick purulent discharge, but the whole cornea quite clear.

4th.—Lids much swollen; profuse discharge.

8th.—Swelling of lids diminished; discharge less.

15th.—Discharge very slight; cornea becoming more clear; can count fingers. Left the hospital to attend as an out-patient.

January 15th, 1864.—Called to-day to show himself at the Hospital. Slight haziness of the cornea; no vascularity; reads No. 8 Jaeger without glasses.

(Continued from page 129.)

CASES ILLUSTRATING THE CONNEXION OF THE FIFTH NERVE WITH THE NUTRITION OF THE EYE-BALL.

By JONATHAN HUTCHINSON, F.R.C.S.,

Surgeon to the London Hospital, and Assistant-Surgeon to the Ophthalmic Hospital.

RECENT experimenters have endeavoured to discountenance the old opinion that paralysis of the fifth nerve left the cornea prone to destructive inflammation, and that this followed owing to some direct removal of control over nutritional processes. They have asserted first, that this result is due rather to destruction of the sympathetic nerve-fibres which are incorporated with the

fifth, than to the latter nerve itself; and, secondly, that such inflammations follow only as the results of irritation from without, which the anæsthetic eye does not at the time resent. Thus portions of dust might be allowed to remain on the cornea and set up disease, which, under other circumstances would excite pain, and be brushed away or washed off by the flow of tears. Numerous vivisections have been practised to prove these points. I have at present two cases under observation, in which the cervical sympathetic is paralysed, whilst the fifth is intact. The diagnostic symptoms of this lesion are present in both—retraction of the globe, smallness of palpebral aperture, inability of the pupil to dilate, altered temperature of the face, ear, and neck—in both, the condition is permanent, and has existed more than a year. In neither case has there ever been shown any tendency on the part of the eye, or of any other affected region, to become inflamed. I am, therefore, disposed to suspect that too much weight is given to the supposed importance of the vaso-motor nerve in regard to nutrition, and that after all, it is more probable that the fifth nerve itself is the one concerned. It is quite certain that eyes deprived of their sensation, do not by any means necessarily take on inflammatory changes, but that they are especially liable to such, and that disease originating under such circumstances, is comparatively beyond the reach of treatment, are undoubted facts. We note that the individual who for months has gone about with an anæsthetic eyeball, but with no trace of disease, suddenly, and causelessly to all appearance, becomes the subject of acute destructive ulceration of the cornea. I cannot give much weight to the dust theory, since the kind of inflammation which ensues is quite out of all proportion to such causes, and since the causes themselves are not proved to be in existence. When the entire cornea is lost within a week without any recognised irritant having been introduced, it is impossible not to believe that its state of nutrition was previously disturbed. If accidental irritants lodged on the cornea were the efficient producers of these inflammations, the eye being altered only in its loss of sensation, we should expect to find a state of constant, or at least, very frequent, slight congestion, &c. But this is not so; a patient whose eye has been quite comfortable, despite its anæsthesia, and its inability to warn its possessor of the slight dangers which may attack it, will suddenly, without appreciable cause, take on acute and destructive inflammation. Is it not rather probable that anæsthesia *per se* would, by preventing reflex disturbance, tend to diminish the power of local irritants to induce inflammation? That it does not prevent that power wholly is most certain, but I cannot help suspecting that it lessens it. I incline then to believe in the old doctrine, that either in companionship with (or identical with) the sensitive nerves, there pass nerve-fibres other than and distinct from those of the vaso-

motor system, which are of the utmost importance to the healthy nutrition of the part supplied. Lesions of these nerves, however, cannot be said to directly *cause* inflammations, but rather to *permit* them. These conclusions I base not only on observations on paralysis of the fifth nerve, but also on a series of cases which I have recently recorded in the Medical Times and Gazette, in which various mixed nerves (ulnar, median, &c.) had been cut across, and nutritional disorders ensued in the paralysed parts.

It will be observed that in three of my cases, superficial ulcerations occurred on the cheek, just below the inner angle of the eye, and on the inner side of the base of the ala nasi, close to its junction with the upper lip. Probably in each of these parts the inflammation, predisposed to by the paralysis of sensation and nutrition, was brought into action by the irritation of the secretions dribbling over them.

Total Paralysis of the Right Fifth Nerve with Atrophy of the Muscles and Anæsthesia of Eye and Skin—Epileptiform Seizures and Pain in the Head—Syphilis four years before—Very prolonged specific treatment, with most successful results—No inflammation of the Eye.

The following case is one of the most important in my series, partly on account of the length of time over which the history extends, but more especially as affording an instance of almost complete recovery under prolonged specific treatment. Mrs. Bowmer, now aged 26, the wife of a sailor, first came under my care in 1858, on account of a phagedænic sore on the vulva. No mercury was prescribed, but about a month later she became an in-patient of another hospital, where mercury was given and pushed to a slight ptyalism. A year later, she had rupial sores on the face and arms. These were cured by iodide of potassium. She was now very cachectic, and her husband being often away, I believe she was badly fed. During the next three years she repeatedly came under treatment for syphilitic leucorrhœa, loss of hair, pains in the head, &c. The disease had evidently taken very firm hold of her system.

In February, 1862, Mrs. B. applied to me with the following symptoms:—I had not seen her for about eight months; previously she had taken no medicine. The reader will observe that it was now about four years from the date of the primary disease. She stated that she had, during the last few months, had several seizures, and that she felt as if she should lose her senses. Her aspect was vacant and bewildered. I found, on examination, that she had not the slightest sensation on the right side of her face. All the parts supplied by the fifth nerve on this side were totally devoid of feeling, and her eye might be touched with a

feather without causing her to wink. She could not eat on the right side, because she could not feel the food against the cheek or gums, and she could not taste with the right half of her tongue, in its anterior two-thirds:—further back, on this side, she could taste fairly. The experiments as regards her power of taste were repeated on several occasions and with different substances, always with the same results. Her temporal and masseter muscles on the affected side were totally atrophied. My friends Dr. Weber, Dr. Hughlings Jackson, Dr. Jones, and others, repeatedly examined her, and none of us could detect the slightest evidence of contraction in these muscles. The temporal fossa was hollowed by the entire atrophy of the muscle. Mrs. B. complained of a good deal of pain in her head, but chiefly of very distressful feelings, “as if she must lose her senses.” Her gait was unsteady, she was weak in her right side; she stated that she had several times been suspected to be intoxicated. She had twice had a sort of fit in the street, not wholly losing consciousness, nor as far as I could make out, being convulsed. Excepting a general state of cachexia, and some tenderness of scalp, there were no other syphilitic symptoms present. It was difficult to assign an accurate date to the paralysis of the fifth, but I think there was little doubt that it had been in its present condition for at least six weeks. The eye was not inflamed.

We at once admitted the woman as an in-patient, and she remained in the Hospital for about a month, taking throughout full doses of iodide of potassium (gr x t. d.) with ammonia. During the first few days she had several seizures, with partial loss of consciousness and without convulsion. She seemed very ill, complained much of weakness in the right limbs, and as the symptoms seemed to point to central disease, I scarcely expected that she would live. By degrees, however, improvement took place, sensation began to return in the cheek and forehead, and six weeks after the commencement of the treatment, we could discover decided muscular contraction in the right temporal. When she left the hospital (four weeks), she had ceased to be liable to seizures, and was much improved in health; still, however, she had not perfect control over the right limbs, and her gait was unsteady. There had throughout been no inflammation of the eye, but several times the conjunctiva had been for a while much congested.

During the next three months, Mrs. B. continued to attend as an out-patient, and still took the iodide with progressive benefit. I then lost sight of her, as she went to live in the country. A few days ago, however (January, 1864), she again applied. It is now rather more than two years since the paralysis of the fifth began. She is now able to feel as well on the one side as the other (this was tested with the compasses), excepting on the mucous membrane of the eye itself which is still decidedly

numb, though not anæsthetic. Her vision is perfect, the masseter and temporal muscles of the affected side can be easily felt, but are not quite so vigorous and plump as on the other side. She has gained flesh and colour, and is able to walk firmly. She complains much of her memory and of the old feelings in her head, but they are much less than formerly. During the last two years she has taken the iodide almost continuously. She says that she gets worse at once if she leaves it off. Her scalp over the forehead, at a part where she formerly complained much of pain, is now depressed over a considerable surface, as if there had been superficial absorption of bone. No abscess ever formed here, nor was there ever any material swelling.

Sudden and rapid destruction of the entire Cornea in connexion with total paralysis of the fifth nerve—Constitutional syphilis five years before—No other symptoms of syphilis present at the time—Excision of the globe (unfelt)—Details as to the extent of integument involved in loss of sensation.

Mary M., aged 23, applied at the Ophthalmic Hospital in the latter part of October, 1863. She was a healthy-looking young woman, of dark complexion. The cornea of her right eye was in a state of grey slough like wash-leather, the conjunctiva about its margin being brick-red, and much swollen. She said that the eye had been perfectly well until a week ago, when, as she supposed, she must have caught cold in it. It rapidly got worse, and passed into its present hopeless condition. The eye was moist, but there was not much discharge, and there were no indications of irritation of the lids by overflow of tears. She said that she was quite well in all other respects. The manner in which she exposed the eye for inspection attracted my notice, for she appeared not to have the slightest intolerance of light, nor any pain in opening the lids. On touching the cheek I found that she could not feel, and the examination being carried further, it proved that the fifth nerve was wholly paralysed both as regards motion and sensation. The temporal and masseter muscles were quite atrophied. All the usual symptoms were present; she could not taste in the anterior two-thirds of her tongue on the affected side. She had noticed that no tears had of late flowed from the inflamed eye. We could not obtain definite information as to how long the paralysis had existed; she thought she had felt numb in the cheek for some weeks, but she appeared to have paid no attention to the symptom until her eye inflamed.

On inquiry, the girl stated at once that she was a prostitute, and that she had suffered from "the disease" five years ago, and that it was followed by rash and sore throat. In the course of a few months she got quite well, and had never had any

symptoms until the present. As stated above, she now presented the aspect of good health, and had not a single symptom, excepting the paralysis of the fifth. There had been latterly a little headache, but not much. As far as my memory serves me, I believe she had in the first instance been salivated, but this point is unfortunately omitted from my notes.

With a view to clinical teaching from so interesting a case, I admitted the girl into the London Hospital, and there, a week later, we excised the lost eye-ball. My reason for doing this was chiefly to expedite the process of recovery: the entire cornea being one slough, and the iris bulging at a central perforation, it appeared probable that we might have suppuration of the globe. The iodide of potassium was from the first prescribed in large doses, in combination with ammonia.

November 4. The excision was performed to-day. The girl took no chloroform, and in the midst of the operation she reminded me, with the utmost composure, that I had promised her a glass-eye. After the excision was complete and water was being applied, she suddenly exclaimed, "It's running down my face," and I noticed that the water had passed over her orbital region to a part supplied by the cervical nerves. Until this occurred, she did not experience any sensation whatever throughout the operation. The bleeding was arrested easily, and the parts healed much as usual.

The following are the notes of her state a week later when assisted by suggestions from Mr. Dixon, and, in the presence of the Clinical Class at Moorfields, we carefully tested the amount of sensation, &c.

November 12. The conjunctiva is well healed. She is still quite anæsthetic over the greater part of the right side of face: completely so on the conjunctiva, forehead, upper part of cheek, side of nose, and lower part of cheek. There is a patch, the size of half-a-crown in the middle of the cheek, an inch directly in front of the right ear on which she can feel slightly, but she does not always recognise a prick even here. On all parts of the ear itself she can feel well, and never makes mistakes; even in the meatus she can feel very fairly, if not perfectly. There is a little discharge of thin pus from the meatus. On the forehead she does not feel even when a sharp point is pressed deeply in. The nostril, close to the angle of the ala with the upper lip, is ulcerated, but there is no ulceration of the cheek below the inner canthus. The tongue is slightly more furred on its anæsthetic half than on the other, but not materially so. There is no difference in the coating of tartar on the teeth of the two sides. We could not demonstrate any difference in the temperature of the two sides of the face. The conjunctival surfaces of the lower lids both registered 97° , the cheeks, on both sides 92° .

This patient only continued her attendance for a few weeks. The artificial eye having been supplied, she considered herself well, and did not regard the paralysis. No material improvement had occurred the last time I saw her.

Total paralysis of the right fifth nerve—Atrophy of masseter and temporal muscles and anæsthesia of eye and skin—History of syphilis five years ago—Ulceration of the cornea whilst under observation—Recovery with opacity of the cornea—No improvement in the functions of the nerve under prolonged specific treatment.

Alexander M., a tall, thin Scotchman, aged 26, applied to me at Moorfields, in October, 1863. He complained of pain in his head on the right side, of irritation of the eye, and soreness of the lid. There was superficial ulceration just below the inner canthus, and again in the right nostril at the junction of the ala and cheek. He was aware that his cheek was numb. I found on examination that he had total paralysis of the right fifth nerve, with all its usual symptoms. The temporal and masseter muscles were completely atrophied, and the hollow left, in the temporal region, is easily distinguishable in a photographic portrait which I had taken of him for this purpose. His history, as to syphilis, was as follows:—He had a chancre, about five years ago, and took mercury until his gums were very decidedly sore. After this, he had rash and sore throat. All was well in about nine months, and he remained afterwards quite without symptoms for three years. About a year ago he had sores on his tongue, which a medical man to whom he applied, said were venereal, and treated as such. Last winter (nine months ago), he had very severe pains in his head, especially at night; when he got warm the pain would set in and often kept him awake. This pain was all over on the right side of his head; it has of late much abated. He believed that the numbness had been coming on for about a month.

When this man first applied, although his eye on the affected side was a little congested and irritable, yet he could see well with it, the cornea was not dim, and he habitually employed it chiefly in his business, as the other had, for years, been imperfect. I prescribed full doses of iodide of potassium. After he had taken it about a fortnight, he one day presented himself with more decided congestion of both eyes. As there was a certain amount of coryza, I thought it possible that the condition was due to the iodide, and accordingly discontinued it. In a few days the congestion of the left eye disappeared, but that of the right (paralysed) increased, and an ulcer formed on the cornea. This ulcer was remarkably torpid, and for weeks it scarcely changed; it was quite superficial, but was attended by diffused opacity of the adjacent part to a considerable extent.

It gave him no pain whatever. We kept the eye carefully protected by strapping and cotton-wool, and continued the iodide of potassium, which latter had, in fact, been only disused for about a week.

The following are the particulars as to the condition of things, on November 12 :—

There is still an ulcer, nearly the size of a split-pea, a little below the centre of the cornea. The whole ocular conjunctiva is much congested, and of brick-red colour. There is a little mucous discharge. He sleeps well, and is almost rid of the pain in his head. The ulceration below the inner canthus is quite healed, and that in the nostril nearly so. He thinks he can feel a little better than he did on the cheek, but it is still almost absolutely devoid of sensation. He can feel well in all parts of the ear, and even deep in the meatus. The eye is dry as regards tears, and he says that tears never come into it; for instance, when he sneezes, it is wholly on the healthy side. His right nostril is much dryer than the other, but there is still a certain amount of mucus in it. The tongue is equally clean on the two sides, or nearly so. He is now able to eat a little on the affected side.

Temperature on right side (paralysed).		Left side (sound).	Diff.
Mucous membrane of eyelid	95°	96°	1°
On skin of cheek	90°	91°	1°
Between gum and cheek	98°	98½°	½°

Up to the present date, January 14, 1864, although the remedies have been steadily continued, there has been no improvement in the state of the muscles, nor much in the cutaneous sensibility. The muscles are still wholly wasted, and he has scarcely any feeling in any part of the fifth-nerve territory. The ulcer on the cornea has healed, leaving a large white scar, which almost wholly prevents vision. He has much improved in general health, and is quite rid of the pain in the head, from which he used to suffer. The treatment is still continued. Neither in this man, nor in the girl who is the subject of the preceding case, is the buccinator of the affected cheek paralysed, a fact of some interest in reference to the still debated anatomical question, as to whether the fifth or the seventh (portio dura), is the motor nerve of this muscle. I may just remark, that the most satisfactory method of testing the buccinator, is by placing the finger in the patient's cheek, and then directing him to squeeze it against the teeth. The plan commonly adopted of making the patient blow out his cheeks may deceive.

(To be continued.)

A SUCTION-CURETTE FOR EXTRACTION OF SOFT CATARACT.

By T. PRIDGIN TEALE, Junr., M.A., Oxon., F.R.C.S.

DURING the last three or four years the treatment of soft cataract by "linear extraction" has to a great extent displaced the older and more tedious method of "solution."

In the latter method the surgeon, having broken up the lens with a needle, trusts to the natural process of absorption for removal of the opaque matter. In the former, either finding the lens completely opaque and soft, or in the case of partial cataract, having by a previous operation induced a cataractous condition of the whole lens, he proceeds at once to extract it through a linear wound in the cornea,—in fact, he coaxes out the softened lens through a small opening, by means of the curette.

When the lens is nearly diffuent, it runs readily along the groove of the curette, and the operation is easily completed. Sometimes, however, although opaque, the lens is of firmer consistency, and does not readily escape along the groove. In this case it requires slight pressure to be exerted on the globe to aid its expulsion, and sometimes even the repeated introduction of the curette. Finding this difficulty in one or two of my own cases, it occurred to me that possibly a suction principle might be introduced with advantage. Messrs. Weiss have made from my directions the instrument which I propose now to describe.

The SUCTION-CURETTE consists of three parts: a curette, a handle, and a suction tube.

The *curette* is of the size of the ordinary curette, but differs from it in being roofed in to within one line of its extremity, thus forming a tube *flattened* on its upper surface, and terminating, as it were, in a small cup. The curette is screwed into the "handle."

The *handle* receives the curette and is hollow for a short distance, thus being a continuation of the tube of the curette. Passing out at right angles from this portion of the handle

is a further continuation of the tube, to which the "suction-tube" can be fixed.

The *suction-tube* is a piece of india-rubber tubing, 10 or 12 inches long, having an ivory or metal mouthpiece at one end, and fitting on to the projecting part of the handle by the other.

The following questions now suggest themselves:—

1. Will the suction-curette effect the purpose required?
2. How should it be used?
3. What advantages does it possess?
4. Is the idea new?

1st Question. Will the suction-curette effect the purpose required? Before ordering the instrument I ascertained that the cortical portion of a perfectly healthy lens of an ox could be drawn by a syringe through a fine nozzle. Since obtaining it I have easily drawn through the curette the greater part of a healthy lens. I concluded, therefore, that a soft cataract would pass through still more readily. The following is the first case in which the completed instrument was used:—

CASE.

In the summer of 1862, Mr. G. E. D. was engaged in a sham fight, in which a rifleman discharged a blank cartridge within a few feet of his face. The coarse grains of the powder penetrated the right eye, and lodged in the lens. After some weeks, cataract slowly formed, and last summer was complete and very opaque, so that he could only just distinguish light and shade.

1863. December 18.—The anterior capsule of the lens having been freely torn asunder by two needles, a small opening was made in the cornea by the broad needle through which the suction-curette was introduced. Holding the open end of the curette in the area of the pupil, and slightly depressing it towards the posterior capsule, I withdrew by suction the soft matter, the pupil becoming perfectly clear in a few seconds.

On December 21 (4th day) he read No. 10 Jaeger.

„ December 24 (7th day) he read No. 4.

„ January 13th he read No. 1.

The operation was followed by less discomfort and irritation than I think I have ever seen after extraction of soft cataract.

I have recently operated in two other cases (one traumatic, the other congenital), the effect being equally satisfactory.

In answer to question 2, the following points seem worthy of notice:—

(a.) It is well to use a needle broad enough to make an opening at one puncture that will admit the curette.

(b.) The extreme point of the curette should be well rounded, and not sharp.

(c.) The *cup* (open extremity) and the *tubular portion* of the curette should be of nearly equal calibre, so as to pass readily through the small opening in the cornea.

(d.) The curette should be made with a *broad-milled rim* in front of the screw, to facilitate the screwing into the handle.

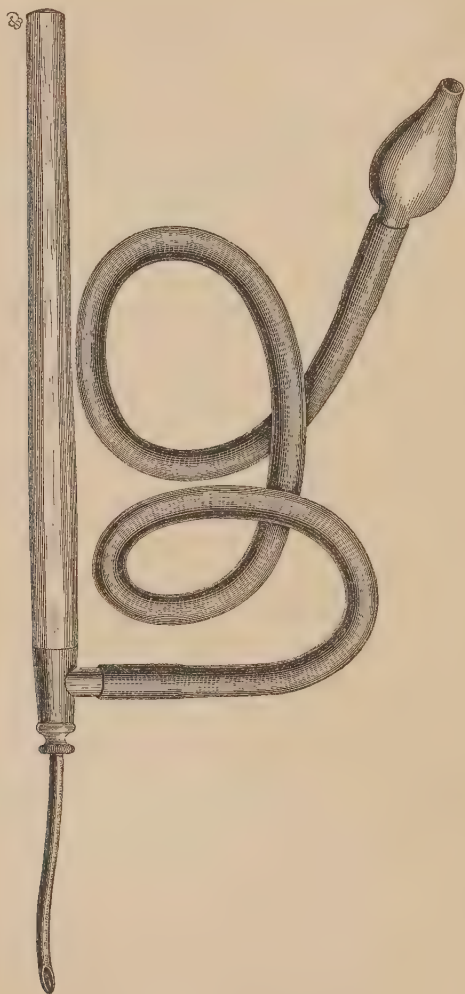
(e.) In operating the open end of the curette should be held carefully in the area of the pupil, and not pushed behind the iris; otherwise the iris might be drawn by suction into the tube and bruised. If this point be attended to and the pupil be dilated, the iris is out of harm's way.

(f.) If the lens be well softened it passes quickly along the curette: if it be imperfectly cataractous, it is stiff and passes slowly. In this case it may be well to withdraw the instrument, to blow out the firm material and then complete the operation.

Question 3.—What advantages does it possess? On this point I speak with diffidence, feeling that further trial of the instrument is required before its advantages can be fully established. But the following may be fairly claimed for it:—

(a.) The possibility of withdrawing soft cataract by suction enables the surgeon to remove the firmer cataracts

with less disturbance of the eye than he can do by any method now in use.



(b.) The suction-curette is capable of more thoroughly removing the lenticular matter which often adheres to the posterior capsule. This fact, if confirmed by future expe-

rience, will much reduce the risk of opaque deposit on the posterior capsule, and the consequent necessity for tearing through this opaque capsule at a secondary operation, a proceeding which occasionally brings on dangerous tension of the globe.

(c.) The suction-power being applied by the mouth, through the medium of a flexible tube, the hand which holds the curette is able to act independently of the suction, and is as free and unfettered in its action as when it is guiding the ordinary curette.

(d.) The suction power being regulated by the mouth and tongue, is more immediately under control, and can be more instantaneously relaxed than would be possible if it were regulated by the hand (as in the case of a syringe), especially if that hand were already occupied in directing the curette.

Question 4. Is the idea new? For my own part it was suggested by a feeling of the want of such an instrument. The idea, however, of extraction by suction can boast of considerable antiquity, as the following quotation kindly sent to me by Mr. Bowman, will show:—

“According to Avicenna a similar proceeding (viz., excision of cataract, by opening in the cornea and drawing out the cataract by means of a needle), was practised by the Persians in the 4th century, and Albucasis reports that the procedure was gradually displaced by the ‘suctions-methode’ in which the cataract was sucked out through a hollow needle.” Arlt. *Krankheiten*, vol. 2, p. 352. Prag. 1863.

In an American edition of Lawrence’s *Treatise on Diseases of the Eye*, 1854, pp. 733, 734, edited by Isaac Hays, M.D., the following notice of an operation by suction occurs. It is quoted from a “Report on the Progress of Ophthalmic Surgery,” in *Dublin Quarterly Journal*, 1848:—

“*Operation by Suction.*—M. Blanchet has lately promulgated a new method of operating upon soft cataracts, which he denominates the operation of suction (par suspiration). The pupil having been dilated with belladonna, he punctures

the cornea with a large cataract needle. Through this opening he introduces a small tube with a flageolet-like mouth, attached to an Anel's syringe, with which he pierces the capsule of the lens, and if the cataract is soft, he pumps it out through the tube by working the piston of the syringe; but if, on the contrary, the lens is hard, or the capsule is dense and opaque, he then has recourse to depression.

"We most fully concur with Mr. Wilde, that this mode of operating is well calculated to raise a smile on the face of every well educated and experienced practitioner. . . . If the lens be fluid, to attempt this suction is a most unjustifiable, as well as a most unnecessary procedure; for the simple introduction of a needle through the cornea and the laceration of the capsule, will allow the fluid to become diffused with the aqueous humour, in which case it will sometimes be absorbed in the space of a few hours. Every operator of experience knows that, even in those cases of fluid cataract, it is necessary to lacerate both the anterior and posterior capsules freely (!!), &c., &c."

Recently in one of the medical journals, an instrument was described by which it was proposed to punch out, by aid of suction, a portion of the iris. I regret that after careful search, I have not succeeded in finding the article, and that I am therefore unable to record the author's name.*

CONGENITAL BLINDNESS IN TWO SISTERS — ABSENCE OF OPTIC DISC AND RETINAL VESSELS.

By WILLIAM NEWMAN, M.D., London.

A feature of chief interest in the following cases is, that although the patients were adults who had been totally blind from birth, yet the pupils were of normal size, and the irides acted well:—

The sisters are:—Caroline Alderman, *æt.* 46, eldest of the family; and Betsy Alderman, *æt.* 33, the youngest but one.

Their father died from cancer of the stomach six years ago, *æt.* 63. Neither his relations nor he himself had any defect in vision.

Their mother is living, *æt.* 67, a hale, hearty, old woman.

* H. Greenway, Esq., Plymouth.—Ed.

Her eyes are perfectly good, nor has she any history of blindness in her family.

There were eight children born, six girls and two boys.

The two boys died respectively at 14 years and 7 months from natural causes, pneumonia, &c.; neither had defective vision.

One daughter died two years ago from uterine disease, *æt.* 43. The others are alive and well. Only the two above-named have anything wrong with their eyes.

The eyes are, in both cases, symmetrical. Ordinary size and shape, and present no altered external appearance. In both, the irides act perfectly.

Caroline (the elder) has hazel irides, and the eyeballs roll about, especially if she is noticed closely or addressed.

Betsy (the younger) has grey irides; the globes are quite under the control of the will; no irregular movements whatever.

Neither one nor the other has the slightest perception of light; the strong glare from the gas-lamp with the ophthalmoscope does not in the least affect them, nor give a sensation light, nor of discomfort.

The use of the ophthalmoscope is difficult with the elder one; the eyes are so constantly in movement; but no disc nor retinal vessels could be seen, but the fundus of the eye was very much the same as in her sister.

Betsy. The ophthalmoscopic examination is easy; cornea quite transparent; iris healthy and non-adherent (dilates well with use of atropine); lens transparent.

No appearance of optic disc, retinal vessels, or yellow spot, but an irregularly star-shaped patch of dark non-vascular appearance occupies the place of the disc. (Sclerotic, I believe, uncovered by choroid membrane).

The parents of these women were not related before marriage: neither they nor the offspring were at all deaf; and in these two blind women the hearing is certainly very good.

The following are some details as to the degree of activity of the irides:—

1. The pupils are usually of normal size.

2. I exposed both sisters to bright sunlight the other day, and the pupils became at once very small, mere pin-head size.

3. Withdrawing them from the light the pupils resumed at once their normal size.

4. With a square of Squire's atropine-paper the iris was in 8 min. much reduced in breadth, and in 15 min. the pupil was as large as it is in ordinary cases from atropine.

5. I used Squire's Calabar-bean paper after employing the ophthalmoscope, and in 10 min. the pupil was certainly smaller (not normal, and I have found that the Calabar-bean paper will not thoroughly or quickly antagonize the atropine paper).

6. With the use of a candle in the ordinary way, shading and withdrawing the light, &c., &c., the pupils acted almost as quickly as in ordinary people.

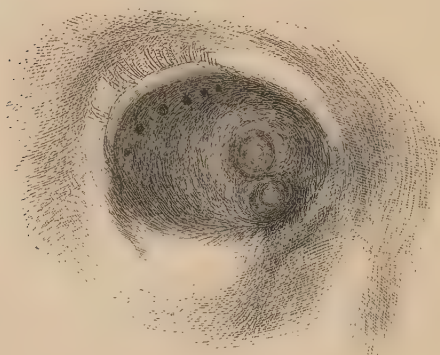
My conclusion on the whole would be that the irides have the same range of action as in healthy eyes, but that, except under strong stimuli, their movements are not accomplished quite so rapidly, but the difference in this respect requires close watching to make out.

CASE OF SEVERE BURN OF THE FACE, CAUSING DESTRUCTION OF THE RIGHT EYE. THE ORIFICES OF THE DUCTS OF THE LACHRYMAL GLAND EXPOSED.

UNDER THE CARE OF MR. WORDSWORTH.

REPORTED BY W. S. WATSON, Clinical Assistant.

John Fisher, æt. 37, the subject of the accompanying sketch, applied at the Royal London Ophthalmic Hospital to



Mr. Wordsworth, on November 22nd, 1862, in the hope that some operation might be performed in the left eye with a prospect of restoring some amount of vision.

He was burnt in his bed in a large fire at Leeds 8 years ago, when he sustained the injury which has left such fearful disfigurement behind it. The whole face is scarred, and scarcely a vestige of healthy skin remains. The right eye is entirely gone, and its place occupied by a cicatrix lining the orbital

cavity, which has assumed somewhat the appearance of cuticle. The lower eyelid is entirely wanting, so that the cicatrix tissue lining the orbit is directly continuous with the skin of the cheek, which is also partly covered by cicatrices. The only remains of the upper lid are a few lashes, and the palpebral margin attached to the outer half of the superior margin of the orbits. At the bottom of the cavity are two nodular prominences, which are the shrunken remnants of the globe of the eye, and have a certain amount of muscular movement, in concert with the movements of the left eye. At the upper and outer angles of the cavity are the ducts of the lachrymal gland, arranged in a crescentic form—six in number. The secretion of the gland can be made to escape by using slight pressure on it just above the ducts.

The left cornea is perfectly opaque, with the exception of a portion at the lower part, through which a whitish moveable body can be seen indistinctly—probably a shrunken lens dislocated and lying loose in the anterior chamber. He has some perception of light with this eye, sufficient to enable him to find his way about the room.

It is hardly necessary to say that it was deemed impossible to improve the vision by any operation.

PART II.

Periscope.

OBSERVATIONS ON COMPRESSIVE BANDAGES.

By PROFESSOR VON GRAEFÉ.*

(ABRIDGED AND TRANSLATED BY SOELBERG WELLS.)

THE beneficial effects to be derived from a compressive-bandage in some affections of the eye, and after certain operations upon this organ, have not till lately been fully recognised; indeed, this subject has not yet received all the attention it deserves. It might be supposed at the first glance that the mode in which a compress is applied to the eye is of little moment, and requires but little care and exactitude, but this is not so; an ill-adjusted, badly-fitting bandage will do more harm than good, and for this reason it is better to abstain from its use altogether, if we are prevented from putting it on ourselves, or cannot entrust its application to a careful and competent assistant or nurse. Indeed, this forms the chief obstacle to its more extended use in hospital practice, as we cannot generally place dependance upon the nurses or the friends of the patients.

Von Graefe has for a number of years experimented largely as to the advantages to be derived from various forms of compresses, and in the valuable memoir, of which we give an abstract, he enters fully into the mode of their application, pointing out the cases in which they are chiefly indicated, and prove most beneficial.

Hypocrates already employed a species of compress to prevent the protrusion of the eye, and to keep local applications in situ. Jesu Hali appears to have been the first who used it in staphyloma; but in the 17th and 18th centuries compresses were already much employed in exophthalmos, staphyloma, operations upon the eyelids, affections of the lachrymal sac, &c., by Guillemeau, Cornelius von Solingen, Pierre Dionis, and others.

* Arch. Ophthal. vol. ix, 2, p. iii.

An important circumstance in connection with the history of the compressive-bandage is the fact that Daviel,* in his introduction of the extraction of cataract by the flap operation, made use of a slight compressive-bandage, "on applique les emplâtres, par dessus un peu de coton en pelote et on contient le tout avec un bandeau sans le trop serrer." Gisbert de Witt, Jung, Gleize, Wenzel, also made use of different kinds of compresses after extraction. Alexander and Middlemore likewise employed a compress after this operation, the latter says, "I am in the habit of placing over them (the lids) a square piece of linen, upon which a little spermaceti ointment has been smeared, and afterwards a thin fold of linen soaked in cold water, which is bound upon the eye (not so as to produce *firm compression*), with a little roller about an inch and a quarter broad, which may be secured to a slightly elastic cap which has been previously placed upon the patient's head." But the chief credit of the introduction of compressive-bandages in extraction, is undoubtedly due to Sichel, who was also the first to attribute the ill-success which sometimes follows this operation, chiefly to the suppuration of the incision, and not, as had been before the case, to inflammation of the iris. At his instigation, von Graefe was led, in 1850, to commence an extended series of investigations into the whole subject, which he has carried out up to the present time.

The Principle of the Compressive-bandage.—Every kind of pressure which acts upon one point, or upon one circumscribed portion of the eyeball, soon produces discomfort and pain. The compress should be so applied that the upper lid is gently stretched (laterally) across the eyeball, and the lids kept immovable. We can easily imitate this mode of pressure, by placing the point of one forefinger against the gently closed upper lid at the inner canthus, slightly above the ligamentum palpebrale, and then placing the other forefinger just above the outer canthus, drawing the upper lid outwards. The two points of pressure will then be at the inner and outer canthus, and the eyeball be pressed upon only by the lid stretched gently across it. A compress applied according to this principle will be free from all pain and discomfort. The pressure produced by super-imposed strips of sticking plaster, cotton wool, sponges, &c., is generally irregular, pressing more upon certain portions of the eyeball than upon others, and for this reason they prove unserviceable. Von Graefe employs three kinds of compressive-bandages. 1st. The temporary; 2nd. The regular; 3rd. The pressure-bandage. The best material to employ for the compress is fine charpie, folded into small, carefully prepared pledgets, having a diameter of about three-quarters of an inch, and being of very slight

* Daviel (1747) sur une nouvelle méthode de guerir la cataracte par l'extraction du cristallin.

thickness. The charpie* need not be excessively fine, but must be free from all hard lumps and rough tangles. The patient being directed to close his lids gently (as if asleep), an oval piece of fine linen is then laid over the lids, so as to prevent any of the threads of the charpie from getting in between the lids, which might cause considerable irritation, and also in order to soak up some of the discharge, which would otherwise clog and harden the charpie. A succession of the small pledgets is then placed over the ligamentum palpebrale so as to fill out the hollow, and when this cushion has gained a certain height the padding is continued to the furrow, between the globe and the upper edge of the orbit, and thence extended to the outer canthus. These hollows should be filled up until the cushion is everywhere on a level with the eyeball, over the convexity of which, particularly if the eye is very prominent, only a thin layer of charpie should be placed. From time to time the palm of the hand should be pressed against the cushion, in order to ascertain whether the pressure is regular, or whether there is perhaps a little too much or too little padding in certain parts, in which case this is to be rectified. The palm of the hand should be again applied before the roller is put on, to ascertain that the eyeball can no longer be felt. We have next to consider the three different forms of bandage.

1st. The Temporary Bandage. A knitted cotton bandage, 15 inches in length, and $1\frac{3}{4}$ inches in breadth, is to be applied over the cushion of charpie, and passed towards the back of the head, the strings which are attached to its extremities are then to be brought forward again, and tied over the forehead. The roller is to be applied sufficiently firm to render the pad immovable, but is not to exert any uncomfortable pressure upon the eye, care being also taken not to disarrange the position of the pad during its application. A simple flannel bandage, or even a small handkerchief, may be employed in place of the knitted bandage.

2nd. The Regular Compress. In this case the bandage is to be about $1\frac{3}{4}$ yards in length, and $1\frac{1}{2}$ inch in breadth; the outer two-thirds to consist of fine and very elastic flannel, the central third of knitted cotton. The eye having been padded, the bandage is to be adjusted in the following manner:—One end is to be applied to the forehead just above the affected eye, and is then to be passed to the opposite side of the forehead, above the ear to the back of the head: the knitted portion is then to be

* Charpie is composed of the threads of very fine Irish linen. The linen should be cut into small squares of about three to four inches in diameter, and the individual threads are then to be pulled out, these forming the charpie, which should then be folded up into small pledgets. I for some time used cotton wool, but found it less cool and comfortable than charpie.—S.W.

carried on below the ear, and brought upwards over the compress, the bandage being passed across the forehead, and its end firmly pinned. The opposite eye may be closed with sticking plaster, or if it also requires a compress, a separate bandage is to be applied to it.

3rd. The Pressure-compress, which is intended to produce the strictest immobility, and to exert the greatest amount of graduated pressure, is distinguished from the last chiefly by the fact that it consists of three ascending turns of the bandage, instead of one. The bandage, which is to be made of fine, very elastic flannel, should be about $3\frac{1}{2}$ yards in length, and $1\frac{1}{4}$ inch in width. The one end of the bandage being placed between the angle of the jaw and the ear of the affected side, it is to be brought up over the compress (but not applied too tightly), and carried across the forehead to the back of the head, and then passing again beneath the ear, a second turn is to ascend (somewhat more vertically) over the compress, pressing firmly upon the latter; the bandage is then again carried across the forehead to the back of the head, and brought finally once more beneath the ear over the compress, but this time it is not to be pulled tight. The object of this last turn being to prevent the displacement of the pad by the firm pressure of the second turn of the bandage, it should be made as little ascending as the ear on the one hand, and the bridge of the nose on the other, will permit. If, after its application, the patient only complains of a tight feeling in the head, it need not be altered, but if the eye begins to feel painful the bandage should be loosened, the two last turns being unrolled, and less firmly re-applied. The other eye is to be closed by a strip of court plaster or a temporary bandage, for two pressure bandages are generally found to be too heating.

The indications for the employment of compressive-bandages.
—These bandages have proved of particular benefit in the after-treatment of operations on the eye, more especially in the extraction of cataract. They oppose the movements of the lids and of the eyeball far more efficiently than the simple bandage, which only closes the eyelids. Some have feared that the increase in the temperature, and the retention of the secretions might prove injurious, but in the majority of cases these objections do not hold good. Since 1855 von Graefe has employed the compressive-bandage in 900 cases of extraction, and in comparing the results with 600 other cases of extraction in which it was not used, he finds that its application undoubtedly furnishes the following marked advantages:—1st. The number of cases of complete suppuration has diminished (4 per cent. instead of 7 per cent.). 2nd. The limitation of partial suppuration is far more frequent. 3rd. The cases of prolapse of the iris have diminished, and its course has become more favourable. 4th. The upward incision can be substituted for the downward, without any dis-

advantage. 5th. The after-treatment may be more liberal. The compress may be put on directly after the operation has been finished, or what is preferable, when the slight pain has subsided after the application of a cool, moist compress. It should be drawn somewhat tighter than usual if any of the vitreous humour has escaped, or if there is blood in the anterior chamber. Though tight, it should not give rise to any feeling of pain or uneasiness in the eye. If the eyes are deeply set, particularly if the cornea has collapsed somewhat, the bandage must be firmly applied at first, but may afterwards be gradually relaxed a little, the pin being put a little further back every two hours. If all is going on well, the bandage may be left on for the first six hours, but the following ones need not be changed for twelve or sixteen hours, the outside of the lids being gently wiped with a moist sponge before each re-application. On the second or third day, when the state of irritation is generally most considerable, the bandage should be somewhat relaxed. In some cases it is necessary to exchange the compressive-bandage soon after the operation for a simple bandage which merely closes the eye. The necessity for this change depends less upon the prominence of the eyes, than upon individual contra-indications. Some persons are peculiarly affected by the application of the compress, it causes in them great congestion of the head, heat, singing in the ears, dizziness, &c., this being particularly the case during the hot summer months. On removal of the bandage we then find the upper lid somewhat prominent, which is not, however, due to any chemotic swelling, but merely to the retention of the tears. These patients also show a tendency to the so-called entropium spasticum after the lids have been closed for some time. On its appearance, the bandage should be left off at once.

But what are the indications for the use of the compress when any unfavourable symptoms show themselves? If there is slight pain in the eye during the first eight hours, von Graefe continues the compress. If symptoms of prolapse of the iris show themselves within the first twenty-four hours, the eye should be carefully opened, and the real state of the case ascertained. If a prolapse has occurred, the common compress is to be changed for the third form—the *pressure* bandage—which must, however, be very carefully applied; it accelerates the union of the prolapse with the edges of the wound, thus preventing any further protrusion of the iris. In the circumscribed irritation of the wound, dependent upon a faulty adaptation of its edges, the effect of the bandage is most marked. In cases of suppuration of the cornea after extraction it is essentially necessary to open the lids, in order to ascertain the real condition of the eye. If we find that there is already a marked diffuse suppuration of the cornea, the compressive-bandage

is to be at once discontinued, for by its heating and irritating effect it accelerates general suppuration of the eyeball; in such cases most relief is found from warm, moist applications. If a diffuse suppuration of the cornea is *threatening*, von Graefe would also desist from the bandage and use warm camomile fomentations, until the process shows a tendency to become localized to the vicinity of the wound. The beneficial effect of the compress is most marked when the suppuration shows a tendency to remain circumscribed. In such cases the pressure-bandage is to be employed instead of the compress; at first this is generally to be removed every two hours, afterwards less frequently; and during the intervals, lukewarm camomile fomentations are to be applied for an hour or two. In genuine iritis the compresses are not borne well, and should therefore be exchanged for a simple bandage or handkerchief, and recourse be had to other remedies.

If everything has gone favourably after the operation, von Graefe generally leaves off the compress at the end of a week, re-applying it, however, at night time. But if the patients prefer the bandage, or if they are restless it may be employed for another week. In cases of prolapse of the iris he continues its use for the longest period, until the removal of the prolapse by operation. It must be discontinued early if there is copious conjunctival secretion, redness of the edges of the lids, or if the latter are excoriated, or there is a tendency to entropium. We occasionally find that if patients have been discharged from the hospital somewhat too early, that the wound becomes irritable in the third or fourth week, or even later, more particularly if the operation has been performed downwards; and in such cases we may reckon with certainty upon the good effects of the pressure-bandage. Von Graefe calls attention to another rare and most dangerous complication which may occur during the third week after the operation. The eyelids become moderately swollen, a portion of their edges assuming a dark-red colour, the eye becomes irritable, and there is some subconjunctival swelling, and then there appears at one point of the already united wound, an intensely yellow infiltration, which is not surrounded by any grey swelling of the cornea, and which rapidly extends through the whole thickness; then passing along the wound it gradually invades the flap, and its progress, though slow, leads, with a pernicious persistency, to suppuration of the cornea,—even in the early stages it becomes complicated with suppurative iritis. In its treatment, leeches and cold applications were found of the least, pressure-bandages and lukewarm fomentations during the interval, of the most benefit. The bandage should only be applied for a short time, be most accurately adjusted, and be discontinued as soon as the infiltration shows a tendency to become diffuse.

Although the compressive bandage proves of particular benefit

in the after-treatment of extraction, it is also useful in other eye operations; as, for instance, in the linear extraction of cataract or of foreign bodies, in operations followed, perhaps, by intra-ocular hæmorrhage, as in iridectomy, in chronic iritis, irido-cyclitis, or in glaucoma. It is also of benefit in cases in which some vitreous humour has escaped after any operation. Von Graefe likewise employs it after the removal of staphyloma, in those cases of strabismus operations in which a conjunctival suture is applied, as it prevents the friction of this against the eyelids; in the operation of readjustment, i. e., bringing forward again the insertion of a muscle which has receded too far after a previous division; and in operations upon the surface of the cornea, the conjunctiva (pterygium, symblepharon, &c.), and the eyelids. It also proves advantageous in the treatment of wounds and injuries of the eye, as in cases of abrasion of the epithelium of the cornea, perforating wounds of the sclerotic, accompanied by more or less considerable protrusion of the vitreous humour, intra-ocular hæmorrhages, and wounds of the conjunctiva, eyelids, and muscles of the eye.

In certain of the more dangerous affections of the cornea, much benefit is also to be derived from the appropriate and judicious use of the compressive bandage. In the torpid, purulent infiltration of the cornea, the third form of bandage (the pressure bandage) is particularly serviceable, and should alternate with warm camomile fomentations; by these means we accelerate the tendency to a limitation and demarcation of the process; if, however, the disease becomes complicated with iritis, iridectomy is generally urgently indicated.

The bandage will also be found very serviceable in perforating ulcer of the cornea, accompanied by protrusion of the iris, as long as it does not increase the irritability of the eye, the pain and lachrymation, otherwise it must be at once discontinued. It should also be employed in those pustular and ulcerative forms of corneitis which show a tendency to spread rather in circumference than to perforate, more particularly if there are several of these pustules, and the neighbouring cornea shows a tendency to suppurate, the great fear in these cases being that the individual pustules should coalesce, and thus cause a considerable destruction of the cornea; here, also, our object must be, if possible, to limit the process. If there is much irritability and inflammation of the conjunctiva, more particularly where the affection of the cornea is propagated from the conjunctiva, as in acute granular ophthalmia or ulcerative conjunctivitis, the bandage is contra-indicated.

A light bandage may also be applied in neuro-paralytic affections of the cornea, as it guards the latter against the access of the air, the contact of foreign bodies, and the movements of the eyelids.

[I have for some years past made constant use of the compressive bandages according to Graefe's mode of application, and have derived most beneficial effects from them. Until he kindly sent me some of his knitted bandages, I was in the habit of employing fine elastic web and thin gauze bandages, which are light and cool, and prove efficient if they are applied in the manner above directed; they are not, however, so good as Graefe's bandages. Care must always be taken that the compress of charpie be properly adjusted, and that it thoroughly fulfils the requirements already mentioned, especially that it does not press upon one particular point of the eyeball, but that it is so arranged as to exert a slight pressure upon the globe by the eyelids being stretched gently across it. If it be thus applied, the compressive bandage will prove comfortable and painless.—S. W.]

ON PERFORATION OF DETACHED RETINA AND ON DIVISION
OF MEMBRANOUS OPACITIES IN THE VITREOUS HUMOUR.

BY PROFESSOR A. VON GRAEFE.

Archiv. f. Ophthalm. Vol. IX, 2, p. 85, 1863.

(Translated by Geo. Henry Rogers.)

DETACHMENT of the retina is, without doubt, one of those diseases, the treatment of which has hitherto afforded the oculist but slight satisfaction. In a few cases, and those only met with under exceptional conditions, a real cure of sometimes many years duration, or perhaps a temporary improvement,* is obtained, but an infinitely larger proportion of affected eyes is in no very long time utterly lost.

* The greatest improvements in central perception and in the extent of the field of vision are observed in the earlier months of the disease during the process of gravitation of the effused fluid to a lower level; these have not unfrequently raised illusory hopes of a complete cure, when, viz., the ophthalmoscopic examination about the equator has been conducted without due circumspection and testing of the field of vision, and without using that feeble degree of illumination which it is so desirable to employ in all the more delicate anomalies. Improvements are sometimes also observed at a later period, either spontaneous, or from re-absorption of the subretinal fluid under derivative treatment; in these cases excentric vision, corresponding to the detached portion, may increase to an unexpected degree, and the function of the central part previously impaired (through extension and slight serous infiltration?) may almost regain its normal activity. Finally, rupture of the retina may bring about similar favourable results. That the issue varies infinitely from fundamental causes I have already pointed out in other places (vid. Archiv. f. Ophthalm. vol. III, 2, page 394, and Zehender's klinische Monatsblätter, Febr. 1863).

Under this unfavourable state of things it is intelligible that recourse should have been had to surgical expedients, and accordingly puncture of the sclerotic was proposed, in the hope of evacuating, by this means, the subretinal fluid, and procuring the re-adjustment of the membrane. Sichel, who had already performed this operation with much advantage in internal inflammations, hydrophthalmic degeneration, &c., suggested a trial of the same procedure in detachment of the retina.

It appears, however, from his communication on this subject (*Clinique Européenne*, 1850, No. 29), that he had never as yet practised this method with the view of preserving or improving the visual function, but that he had only resorted to it in the last stages of the disease, to give relief from inflammation and ciliary neurosis. Kittel reports (*Allgemeine Wiene Medicinische Zeitung*, 1860, No. 23) a case of detached retina, in which he, according to Sichel's plan, punctured the sclerotic several times, and obtained by this means no improvement of vision indeed, but an arrest of the disease for four months, as well as the ophthalmoscopic appearance of the subsidence (although not the re-attachment) of the formerly prominent retina. He draws no conclusion from these circumstances, beyond an encouragement to further trial. In fact, the details of this case, whilst it was under observation, do not differ in so striking a manner from the results that occur spontaneously, as to lead us to consider the disease as really influenced by the treatment.

I confess that from the beginning, puncture of the sclerotic in detachment of the retina, has but little invited my attention. In at least 90 per cent. of the cases, the disease cannot be regarded as an independent mischief, but as the result of staphylo-matous choroiditis, equatorial choroidal changes, disease of the vitreous humour, &c. In such cases the separation of a subretinal fluid ensues, even under the normal pressure of the vitreous, and, therefore, with a diminution of the pressure after puncture, there is an increased tendency to this exudation, and the fluid is reproduced. The view that after puncture [of the sclerotica only], the globe is refilled by transudation into the vitreous chamber, can only be realised if the ratio of secretion and of absorption has become essentially different since the formation of the detachment. Such a change, however, is for the most part prevented by the persistence of the predisposing causes. In that smaller proportion of cases, in which the detachment was induced by accidental agencies, such as hæmorrhagic effusion from a wound, fragments of a reclined lens, abscess behind the globe, and the like, the evacuation of the fluid might naturally effect our purpose, especially if the tendency to a rapid transudation be checked by the application of a firm bandage, which is only gradually slackened. Only in such cases too, can we suppose that there would be a fair chance

of a diminution or entire removal of the subretinal fluid without surgical interference.

On the ground of these considerations with regard to puncture of the sclerotic, I addressed myself to another measure, viz., the establishment of an artificial communication between the subretinal sac and the vitreous chamber. If such a free communication exist, the pressure within the subretinal cavity becomes equal to that of the vitreous, and under such conditions the tension, which the outer surface of the detached portion sustains, is removed. Even if the exciting cause of the transudation continue, an increase in the detachment need not necessarily follow, since now the stream of fluid is conveyed into the vitreous chamber. In many cases also the whole of the already accumulated subretinal fluid is probably poured into the vitreous cavity, and with the increase of pressure on its inner surface, the retina returns to its normal position, surely under much more favourable conditions than after puncture of the sclerotic. In increasing staphyloma of the globe, too, the stretching of the retina may be relieved by the breach in its continuity, which will greatly counteract the mechanical conditions. The risk (which is so great in this class of eyes) of new effusion, of internal hæmorrhage, &c., from diminution of pressure, is not in this case increased as it is in puncture of the sclerotic merely.

To such theoretical conjectures is added the practical experience of the behaviour of detached retina under spontaneous perforation, the occurrence of which was noted by me in the early stages of ophthalmoscopic research (vid. Archiv. f. Ophthalm., vol. i., page 358), and since then has been repeatedly established by myself and others (see a very successful representation in Liebreich's Atlas, Pl. vii., Fig. 1). *Cæteris paribus*, there are no conditions more favourable to a lengthened arrest of the disease than these. The laceration occurs during the phenomenon of gravitation, and matters often come to a stand, which simulates a true cure, since the detachment becomes quite level, and, so to say, recedes to the equator. I could mention patients in my private practice in whom, after gravitation of the fluid had taken place, the degree of vision remained stationary, under the presence of small apertures or considerable lacerations of the retina, for from four to five years (with a satisfactory sharpness of sight, and slight indistinctness of excentric vision above), and in proof of this assertion I would advise a course, else very seldom adopted, viz., the accurate examination of any case of detachment of the retina, which has remained long stationary, for points of perforation, since these if peripheral and of small extent may easily escape observation. When perforated, the detached portion retains longer than otherwise a transparent appearance, shows

on the average a less degree of prominence, and preserves a greater functional activity. Of course, these clinical remarks only hold good when the vitreous is tolerably clear, otherwise the favourable effect of the perforation may be prevented by the obstruction of the small apertures through turbidity of the vitreous, or by the influence of the turbid vitreous on the inner surface of the retina.

An apparent objection to this view lies in the fact that in very extensive, almost total, separations of the retina, large perforations are sometimes found. It is, however, a subject for critical examination, at what period and under what circumstances the perforation occurred. If there were already a large, almost total, detachment, a spontaneous perforation from increase of tension would naturally give no great benefit; and as little, if a breach occurred early indeed, yet with the function of the retina immediately or soon destroyed from excessive effusion. In a word, on full examination, the proposition will be found to hold good, that *the existence of spontaneous perforations is an essentially favourable agent towards the subsidence of the disease.*

Sometimes perforation of a previously untorn retina has taken place under my observation, and the continuous watching of such cases has strengthened my convictions.

It is now six years since I first proposed perforation of detached retina, in order to bring about, by artificial means, the fortunate change which nature sometimes works for us; but I was deterred by many scruples as to the choice of suitable cases. I especially feared that an instrument acting against the outer surface of the retina during the operation, would cause an increase of the detachment. The visual function of such patients hangs already on a slender thread, which we must dread lest we should break entirely by this interference. Only within the last three years have I ventured on the practical experiment, and meanwhile my earlier proposal was put into execution by others, among whom I may mention my valued friend, Adolph Weber.

Yet a long time will probably elapse before I could form a decided judgment on the value of this procedure, for with the great diversity of the natural issues of the disease, and the frequent length of time before any definitive result is obtained, one cannot be sufficiently cautious in the acceptance of therapeutic effects. Meanwhile, the following deductions may be drawn from the experiments which have been made:—

1. Perforation of the retina carefully performed is, as far as some twenty observations go to prove, a safe proceeding; in no case, either recent or chronic, was it followed by any reaction worthy of note, or by any immediate deterioration of vision.

2. In more recent cases, in which the gravitation is as yet incomplete, or only lately completed, there is generally observed an almost immediate improvement in the field of vision and in central perception, showing itself most manifestly a few days after the operation. This improvement was absent in some of the patients of this class, in whom also there was reason to suspect that perforation had not been effected. For not only could no aperture be detected with the ophthalmoscope, which need not, however, necessarily happen, but the other evidences were wanting, such as the altered position and appearance of the detached portion, and the diffuse muddiness of the vitreous dependent on the exudation of the fluid into the vitreous chamber. It was very instructive, that in two unsuccessful cases the repetition of the attempt brought about as well the characteristic ophthalmoscopic appearances (once with, once without a visible retinal aperture) as the above-mentioned functional improvement. I must now, however, make the discouraging statement that the surprising, immediate improvement often appears not to continue. After the lapse of several weeks or months, the detachment, scarcely yet level and returned to the equator, again became prominent and of increased extent, so that the event had proved almost the same as after spontaneous gravitation. In none of the operated cases, however, has it as yet proceeded to total extinction of sight. Is this an evidence of favourable result? Is the fate of operated eyes more fortunate in the end than that of eyes not operated on? The future must show; at present the period of observation has not been sufficiently prolonged to establish a decided opinion, and I may not form an unauthorised conclusion from the analogy to spontaneous perforation, of the relatively favourable influence of which I am convinced. Whether the natural perforation is the ground of the better result, or whether other circumstances coincide with it in procuring the more favourable issue, the question still remains an open one, as to whether lasting apertures, equal to the natural ones, can be attained by artificial means. I constantly see in my experience every inducement to continue the practice of puncturing the retina; since it never does any harm, often affords great immediate benefit, and possibly leads to a less serious termination; there is also nothing to contra-indicate the repetition of the procedure in suitable cases (*vide infra*). Perhaps, too, modifications of treatment may be adopted. In one case, for instance, it was observed that the relapse was preceded by the closure of the retinal wound, which previously exposed to view the contiguous choroid with its peculiar appearance, but was now obstructed by a turbid mass (perhaps vitreous, which had become implicated). If this accident recurs, larger apertures must be provided.

I must here further mention that, altogether my series of

experiments has only comprised eight cases of the earlier stage, whilst in all the rest the mischief had existed for at least half a year. Of these eight cases, seven were complicated with a high degree of posterior staphyloma, which afforded a relatively unfavourable prognosis. A history of individual cases has been hitherto quite impossible, and it was only on a very limited scale that I could make the experiment with the care which the state of patients demanded. One naturally, in the dangers of a new and as yet unfamiliar procedure, meets with a larger proportion of unfavourable cases, and obtains therefore less successful results. The following report may serve as an example. It would be unsuitable to fill these columns of the Archives with a larger number of cases, until I shall have arrived at more positive convictions.

A patient, with a myopia of one-seventh, and with some degree of choroidal atrophy, was attacked eight weeks before his visit to me, with the characteristic symptoms of detachment of the retina in the left eye. I found the outer half of the retina detached up to about 1''' from the yellow spot. The detached portion gave a strong grey reflex, and projected considerably into the vitreous chamber. The limitation of the field of vision was by lamp-light greater than the ophthalmoscopic appearances could account for, since not only the inner half of the field, but also the lower portion of the outer half, was quite deficient, and only in the upper portion of this half did there remain normal excentric vision. The explanation of the disproportion was sought in this way, viz., that the detachment, originally above, had descended by gravitation along the outer half of the retina, whilst the first detached portion had not regained its functions. To this also the recollection of the patient testified, as well as certain ophthalmoscopic signs (especially the marked concave margin of the detached portion), which I look upon as characteristic of the period of gravitation. By daylight, quantitative perception of light was preserved in all parts of the field; even fingers could be counted in the lower portion of the outer half, but nowhere in the inner half. The sharpness of sight in good light was about $\frac{1}{24}$; in twilight, as is constantly the case in detached retina, much less. After some weeks of fruitless derivative treatment, perforation was attempted; no aperture was visible afterwards, nor was there any change in the position of the retina; the field and the sharpness of sight remained quite the same, and the operation was therefore considered to have failed. Probably the retina was punctured, but not, as is necessary, slit open. Eight days after the attempt was repeated; on examination the following morning no aperture could be seen, but there was a remarkable change in the position of the previously carefully-noted detachment; the membrane was now only raised midway between the outer equator and the yellow

spot, and there but slightly; only on the patient looking fully outwards, could any noteworthy projection be seen; of the previously striking folds there was no trace, and the reflex of the detached portion, which had before quite concealed the choroid, was now changed to an almost transparent veil. On the other hand, the vitreous was occupied, especially on the outer side and below, by fine cloudy opacities, which I supposed to be due to the entrance of the subretinal fluid into the vitreous chamber; at one spot these were collected into a rather dense wavy mass, which lay close to the retina, and probably hid from view the retinal wound, since this locality corresponded to the direction of the instrument. The functions had greatly improved; the central sharpness of sight was increased to $\frac{1}{3}$; the field of vision was very satisfactory, fingers could be counted directly outwards and directly beneath at an excentricity of 40° , above at 30° , and inwards at about 20° . The movement of the hand was everywhere perceived up to the margin of the field. By lamplight, of course, excentric vision inwards was much less, but even here there was a remarkable difference from the previous state, for even by feeble lamplight the movement of the hand could be seen at an excentricity of 30° inwards. By the following week a still greater improvement had taken place, and the detachment was reduced to an insignificant aspect about the outer and lower equator. At the end of four weeks there was a sudden relapse. The detached portion again gave a strong reflection, showed a more distinct boundary, and became visibly prominent, although not to such a degree as at first. Hence the field and the sharpness of sight had perceptibly declined. When the patient left Berlin he saw but little better than at his arrival. I had in vain endeavoured, during the subsidence and after the relapse, to ascertain the condition of the retinal wound, but this remained covered by the above-mentioned, wavy opacity; perhaps it was obstructed here as in the case before noticed, and thus the relapse had occurred. The retina was at all events divided; at least, I cannot otherwise explain the sudden alteration in the ophthalmoscopic appearances, as well as the functional improvements, since certainly in this case, as in the others, there was no escape of the fluid externally.

3. In more chronic cases, in which the process of gravitation had been completed for a month or more, perforation of the retina gave in a few individuals positive, but mostly negative results. The former were also naturally of limited extent. To what degree, moreover, they are lasting, further observation must show. In the following case, a relative improvement of at least two years' duration was noticed:—

A lady, of 60, came from the provinces in April, 1861, with capsulo-lenticular cataract, and complete amaurosis of the left eye, as the result of a detachment of the retina of 7 years' duration, so far

as could be inferred from the patient's account, and from the general condition of the eye. The right eye presented a detachment of the retina, which occupied the whole of the lower half, and rose on either side of the optic nerve somewhat above the horizontal diameter, so that the macula lutea was just included. On this account the image of the retina was by the ophthalmoscope still moveable with respect to an agglomeration of pigment cells which, as is so often the case in sclerotico-chloroiditis, had developed themselves here also, corresponding to the macula lutea, on the inner surface of the choroid. The detached portion was everywhere very transparent, except a fold on the inner side, which gave a somewhat intense, bluish reflex. On the outer side of the optic nerve there was a slight degree of choroidal atrophy. The upper half of the field was reduced to a vestige of quantitative perception by dull daylight, and by twilight was entirely deficient; in the whole lower half the patient could see by daylight the movement of the hand, but counted fingers at 11"—12" distance only in a small segment beyond an excentricity of about 20° downwards; by lamplight she could do nothing, but saw the movement of the hand much more clearly in this segment than in any other part of the lower field. Even with this she was quite unable to walk alone, in the best light. The first symptoms which pointed to detachment of the retina were remarked almost two years before she came to me; a year and a half she had been uncertain in her movements; for three-quarters of a year the above described conditions had remained stationary. I may add also that she had previously, on account of posterior staphyloma, used glasses of $-1\frac{1}{2}$ for distant vision.

Before the operation, which was performed on April 10th, 1861, some experiments were made on the functions under different degrees of light, the mean result of which is given above. The operation was quite unsuccessful, probably because the needle was not thrust in far enough. It was repeated on the 22nd; considerable functional improvement followed. On examination on the 25th the patient counted fingers at from 4 to 5 feet, and when the eye was allowed to take its own position at will, the visual line hardly inclined upwards, but was prone to wander outwards, or rather (and indeed most) inwards, evidently by reason of the central retinal affection, which arose from the above-mentioned pigmentary changes in the choroid. In the whole lower half of the field, fingers could now be counted with certainty by lamplight, which was not possible before, and this happened even at 2 feet distance, in a triangular segment of the field, with its base downwards. Most words of No. 20, and here and there words of No. 16 were distinguished, which before was quite impossible. The patient was now able to walk alone, under not too difficult circumstances, by daylight; in twilight she could not. The

principal ophthalmoscopic appearance after the operation was the subsidence of the detached retina. This probably caused a reaction in the contiguous upper part, by which its functional activity was increased considerably, and the same thing must have happened at least in part of the detached portion, since the highest point at which the patient could even count fingers, evidently corresponded to the level detached portion in the neighbourhood of the macula. There was no proof of the actual re-attachment anywhere of a previously separated part. I examined the patient 4 months after the operation, and again a short time since, after the lapse of nearly 2 years, and found that she retained unaltered the certainly very imperfect, but still in a desperate case valuable, improvement noted above, as a careful comparison with the former record showed.

I recently obtained an immediate and visible improvement by the operation in a lady of 30 years, with emmetropic eyes, who soon after her first confinement, was affected with a disturbance of vision in the right eye, which, in the course of a year and a half before her visit to me, had gradually become worse. I found a detachment of the retina rising almost to the horizontal diameter; the detached portion was tolerably transparent; in dull daylight the whole upper half of the field was deficient; in very bright light the motion of a well illuminated hand was perceived indistinctly in the inner segment of the upper half, but not at all in the outer: words of Jaeger 14, and here and there initial letters of Jaeger 11 could be deciphered. After perforation central vision was but slightly improved, since only words of Jaeger 11, and larger letters of Jaeger 8 could be made out, but the field showed a considerable alteration; it was in moderate lamplight just as it had been before in bright daylight. Fingers could now be counted in the whole upper half of the field, with the exception of a small peripheral segment at the outer part. The ophthalmoscopic appearance was especially striking, for besides the collapse of the retina, a marked diffuse turbidity of the vitreous had occurred, evidently owing to the escape of the subretinal fluid.

4. I may add a few observations on the ophthalmoscopic changes visible after our attempts at perforation:—

As various instruments were employed, and the same instruments used in different ways, no constant effect could of course be attained, to which result the great variation in the cases was likewise opposed. Although we can always succeed in making a simple puncture of the retina, it is doubtful whether a real wound of such dimensions as is probably requisite can in like manner be effected. It is conceivable that a membrane so moveable as a detached retina may slightly recede before the edge of ever so sharp an instrument. I would always lay the greatest weight on the ophthalmoscopic signs of the collapse of

the retina, shown by the well-known optical characters of an altered position of the retinal plane, by the diminution of its folds or wrinkles, and by the slighter curve of its vessels, and next to this, on the peculiar form of vitreous turbidity, which seems to follow the escape of the subretinal fluid. The appearance of a retinal laceration not previously existing is of course a proof of the success of the attempt, but this is not by any means apparent in all positive cases; perhaps the aperture may fall on a spot concealed by its position, or may be exceedingly foreshortened; perhaps a small laceration may sometimes collapse through the subsidence of the membrane, and perhaps also the turbidity of the vitreous may prevent a nice examination, especially about the equator.

5. As far as concerns the method of operating, I have relinquished the practice of puncturing the retina from behind forwards, and then slitting it up. Not only are there greater risks of mechanically increasing the detachment; or even of wounding the posterior surface of the lens, but the movements of the needle are much less effective than when on an opposite principle the retina is divided from before backwards. The instrument I employ is a cutting needle, made expressly for the purpose, the blade of which is long, and furnished with two very sharp edges, and the neck of which fills the wound so as to leave no space for the escape externally of the fluid. The needle can be thrust in to the depth of 8"', as far as a globular expansion of the shaft.

For the wound it is best to choose a point on the outer hemisphere, unless the situation of the detachment demands otherwise, for whilst the retina on the withdrawal of the needle should be divided from before backwards, the puncture should be made in the meridian, corresponding to the most prominent part of the detachment. The distance of the point of entry from the corneal margin being from 4''' to 5'', we penetrate perpendicularly into the vitreous chamber for about 6'', and then, pressing one edge of the instrument against the retina, we first by a simple lever-movement on the point of entry, turn the apex of the instrument towards the fundus, and then continue this movement whilst we simultaneously withdraw the needle. By this retracting incision, the continuity of the projecting detachment is divided. To succeed we must avoid the contact of the choroid with the point of the needle, and at the same time afford to the cutting power of the needle its full action, since without the retracting movement the retina would easily slip back uninjured. A little curved knife, such as I employ for the separation of anterior synechiæ, might also prove useful, but would have, in opposition to the more certain cutting power, the disadvantage of being liable to wound the choroid. According to varieties in the several cases, moreover, modifications of treatment may be adopted. The eye must be

firmly fixed, the more as the passage of the needle through the pupil is not at all impossible, especially in the first stage of the operation, and is only to be avoided by regarding the relative position of the needle to the eye. The instillation of atropine is certainly advisable, since it allows us a very diffuse, it is true, yet useful, view of the needle, and moreover enables us to note the conditions, ophthalmoscopically, soon after the operation.

6. With respect to the choice of cases, the greater caution is urged by the perilous nature of the conditions, and the moderate degree of success. At present I find myself chiefly called upon to operate in recent cases of monocular detachment. One points out to the patients how unfavourable the prognosis is, and they readily consent to the operation; the surgeon undertakes no great responsibility as to the chance of success of the treatment; the temporary effects are encouraging to both parties; and finally, we are led to appreciate the value of the procedure at a period in which generally some advantage may be expected. We may employ the treatment in cases where a chronic double detachment exists, with equal functional disturbance in the two eyes, or with greater disturbance in one. We, in such cases, perform the operation on one eye, or on the worse one, and so run little risk, whilst a favourable result gives an instructive comparison between the two eyes. When only one eye remains, and that a tolerably serviceable one, I have not, so uncertain is my experience at present, ventured to propose operative interference. Only when the patient is no longer able to walk alone, is practically blind, and wishes the attempt to be made as a last expedient, have I, as in the case of the above-mentioned lady, thought it advisable to perform the operation.

Although the definitive success of puncture of the retina is as yet problematic, I have formed a decided opinion of the advantage afforded by the *division of membranous opacities in the vitreous*, with perhaps also their displacement. It is well known that a class of vitreous opacities, such as, for example, we meet with after hæmorrhage, or in inflammation of the ciliary processes, is capable of a favourable termination; but in practice, cases of opacities only too often come under our notice, which withstand all treatment, and not only mechanically reduce the visual power, but by their reaction on the retina, prove hazardous to sight. By dividing such membranes, not only is a direct optical effect gained, which, with regard to central acuity of vision is dependent on the slightest matters, but an opportunity is at the same time allowed for future retraction or even absorption, whilst, lastly, by removing such membranous expansions, an injurious influence on the retina is prevented. My

attempts at operation in vitreous affections are as yet too recent to allow of my laying down any rules as to indications. Meanwhile, the following report may be taken as a proof that a field is here reserved for surgical skill.

Ernestine S., aged 19, remarked, about three-quarters of a year before her visit to me, that, on closing the left eye, a dark mass floated before the right as "a thick mist, spiral body, or cloud of gnats." She could, however, still read ordinary type, until, some weeks later, the obscuration had so much increased that this was no longer possible. Soon afterwards the visual power failed, and, according to her statement, had been for half a year in the reduced condition which she presented on her visit to me. Medical treatment had been quite unsuccessful at her own home. On her first visit to me in June, 1862, the patient could count fingers at $1\frac{1}{2}'$ distance, and with $\frac{1}{6}$ could see the initial letters of Jaeger 20 with difficulty at about 2". The field was nowhere wanting; excentric vision inwards was most reduced, so that here she could not even count fingers at a slight excentricity, but could only distinguish the movement of the hand. Externally I noticed a slight dilatation of the pupil, with a proportionately diminished variation under the influence of light, and a greenish discolouration of the iris, such as is often observed in vitreous affections. With the ophthalmoscope I perceived a membrane in the vitreous body which covered as a canopy the outer portion of the posterior segment of the vitreous, spread almost to the equator, and extended with a surface somewhat convex towards the inner margin of the optic nerve; through its inner portion I could see the optic papilla as a pale blotch with its contour quite obliterated, and the details undistinguishable. At the just mentioned (nasal) boundary the opacity became thinner, and lost itself in fine streaks, which were connected by an extremely transparent membrane. These intersected the vitreous at different planes, and floated freely about, whilst the peculiar tent-like membrane, whose reflex was visible under artificial mydriasis even in ordinary daylight, exhibited only a slight waving on the most rapid movement of the eye. I could not obtain an accurate examination of the internal tunics of the eye, on account of the optical impediments in the vitreous. As I expected no aid from medical treatment, partly because of the already unsuccessful attempts, and partly from the appearance of the membrane, I had recourse at once to an operation, by which I hoped to divide the membrane in the visual axis, and thus to gain a better aperture for vision, and at the same time to give the chance of subsequent retraction. The cutting-needle was thrust firmly from the outer side and behind into the eye, which was rolled inwards, but the point of the needle pushed the membrane before it to such a degree that there seemed some risk of wounding the posterior surface of the lens; the needle

was therefore half withdrawn and again thrust in almost parallel to the equatorial plane, so as to break through the off-shoots of the membrane lying to the inner side. A mark of improvement showed itself, in so far that the patient could now read No. 20 correctly with $\frac{1}{8}$, and recognized initial letters of No. 16. The effect, however, of the operation, since the ophthalmoscope showed no great change, was regarded as insufficient, and fourteen days later the attempt was repeated. The needle was now (on the principle before explained in treating of detached retina) introduced from the outer side of the globe *anterior* to the equator, and carried, almost parallel to the plane of the iris, close behind the lens and in front of the membrane, which was then divided from before backwards in several directions. After only a few days there was considerable improvement; in eight days the patient could read with $\frac{1}{8}$ Jaeger 8 accurately, and at the end of three weeks Jaeger 3 fluently at 8" distance, with the naked eye. With the ophthalmoscope this improvement was explained by the recoil outwards of the membrane; for whereas before the operation not only the macula lutea but the optic papilla itself had been obscured by the tent-like opacity, there was now a tolerably clear range to some distance on the outer side of the macula; that is, in place of the thick membrane there appeared now a thin veil of fine floating opacities, broken at intervals. In the dark outwardly retracted membrane, no aperture could be detected. I think that the mechanical effect of the operative procedure was, that as the needle passed along the inner plane of the opaque mass, it caused its separation from the off-shoots of fine membrane with which it was connected at its margin. The opaque membrane itself was pushed outwards, whilst the offshoots were partly stretched, partly torn through (hence the present interrupted opacities). The examination of the retina and choroid hardly showed any noteworthy deviation from the healthy condition.

It was very satisfactory that the shrinking and absorption of the membranous opacities advanced steadily from this time, so that in November, 1862, there was only a rudiment about the outer equator of the thick strongly-reflecting opacity, whilst of the other finer membranes scarcely any trace remained, and the sharpness of sight had increased to $\frac{3}{4}$. The last time I saw the patient was in April, 1863, nearly 10 months after the operation. I could not then detect the slightest turbidity in the vitreous. With the ophthalmoscope the only sign of disease visible was a slight pigmentary change of the choroidal epithelium about the lower equator. The sharpness of vision was almost 1; excentric vision, of normal degree. The iris retained a faint trace of its change of colour. We may certainly derive encouragement for further trials under similar circumstances, from the result which has followed this surgical interference,

and which differs so strikingly from the spontaneous changes or those effected by other kinds of treatment.

CORRECTIONS.

Use of the India-Rubber Band in Ectropion.

Referring to the recommendation of india-rubber bands for the cure of ectropion, in the last number of the Ophthalmic Hospital Reports, page 104, Mr. Streatfield finds he has been preceded in this by Dr. Mackenzie, who, in his "Practical Treatise on Diseases of the Eye," 4th edition, p. 196, under the head of Ectropium, says: "I have, in other cases, found a circular band of vulcanized caoutchouc answer very well in keeping the upper lid in its proper situation."

Two Sets of Fibres in the Ciliary Muscle.

Mr. J. Z. Lawrence finds that in attributing the discovery of two sets of muscular fibres in the ciliary muscle, a circular and a radiating, to H. Müller, Van Recken, and Rouget, in last number of the Ophthalmic Hospital Reports, p. 132, he inadvertently omitted to mention the fact of Mr. Wharton Jones having stated, in 1854, in his Anatomical Introduction to Mackenzie's Treatise on Diseases of the Eye (p. xxi.) that "the fibres are of the unstriped kind, and are disposed in orbicular and radiating fasciculi." This statement Mr. Lawrence believes to have been prior to the observations of the other gentlemen above named.

Case of Traumatic Paralysis of the Circular Fibres of the Ciliary Muscle.

In Mr. Laurence's account of this case, published in the last number, p. 131, line 34 from top, for $3\frac{1}{2}$ inches read $8\frac{1}{2}$ inches; and line 3 from bottom, for concave read convex.

NOTICE.

The publication of the Registrar's Report on Cases treated by Inoculation is postponed.